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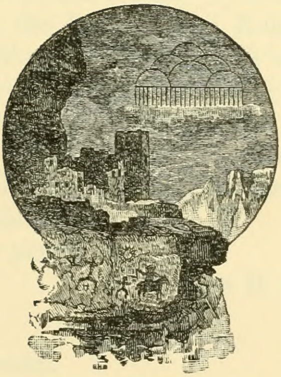

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LETTER OF TRANSMITTAL

Smithsonian Institution,
Bureau of American Ethnology,
Washington, D. C., April 19, 1951.

Sir: I have the honor to submit the accompanying manuscripts, entitled "Prehistory and the Missouri Valley Development Program: Summary Report on the Missouri River Basin Archeological Survey in 1948," by Waldo R. Wedel; "Prehistory and the Missouri Valley Development Program: Summary Report on the Missouri River Basin Archeological Survey in 1949," by Waldo R. Wedel; "The Woodruff Ossuary, a Prehistoric Burial Site in Phillips County, Kansas," by Marvin F. Kivett; "An Archeological Survey of the Addicks Dam Basin, Southeast Texas," by Joe Ben Wheat; "Indian Skeletal Remains from the Doering and Kobs Sites, Addicks Reservoir, Texas," by Marshall T. Newman; "Two Rock Shelters Near Tucumcari, New Mexico," by Herbert W. Dick; "Geology of the Hodges Site, Quay County, New Mexico," by Sheldon Judson; and "The Rembert Mounds, Elbert County, Georgia," by Joseph R. Caldwell, and to recommend that they be published as a bulletin of the Bureau of American Ethnology.

Very respectfully yours,

Frank H. H. Roberts, Jr.,
Acting Director.

Dr. Alexander Wetmore,
Secretary, Smithsonian Institution.

PUBLISHER'S NOTE

With this bulletin the Bureau of American Ethnology inaugurates a new series of River Basin Surveys Papers, designed as an outlet for the reports resulting from the Inter-Agency Archeological Salvage Program.

These papers will be numbered consecutively, a bulletin being devoted to them from time to time as they accumulate. Where the reports are of sufficient size to warrant it, they will be issued as a complete bulletin.

A limited edition of bound volumes will be issued but the papers will be generally distributed in separate form.

CONTENTS

PAGE

Foreword, by Frank H. H. Roberts, Jr XIII

No. 1. Prehistory and the Missouri Valley Development Program: Summary report on the Missouri River Basin Archeological Survey in 1948, by Waldo R. Wedel XV

No. 2. Prehistory and the Missouri Valley Development Program: Summary report on the Missouri River Basin Archeological Survey in 1949, by Waldo R. Wedel 61

No. 3. The Woodruff Ossuary, a prehistoric burial site in Phillips County, Kansas, by Marvin F. Kivett 103

No. 4. The Addicks Dam Site:

- I. An archeological survey of the Addicks Dam Basin, Southeast Texas, by Joe Ben Wheat 143
- II. Indian skeletal remains from the Doering and Kobs Sites, Addicks Reservoir, Texas, by Marshall T. Newman 253

No. 5. The Hodges Site:

- I. Two rock shelters near Tucumcari, New Mexico, by Herbert W. Dick 267
- II. Geology of the Hodges Site, Quay County, New Mexico, by Sheldon Judson 285

No. 6. The Rembert Mounds, Elbert County, Georgia, by Joseph R. Caldwell 303

Appendix. List of River Basin Surveys reports published in other series 321

Index 323

ILLUSTRATIONS

PLATES

(*Wedel*)

1. Aerial view of Medicine Creek Dam site, looking upstream 60
2. Aerial view of Medicine Creek Dam site (construction area at top), looking downstream 60
3. *a*, Aerial view of excavations at 25FT17, Medicine Creek, Nebr. *b*, Excavating a prehistoric house site at 25FT17, Medicine Creek, Nebr 60
4. *a*, View southeast across excavations at 25FT70, Medicine Creek, Nebr. *b*, Prehistoric house sites and other features uncovered at 25FT70, Medicine Creek, Nebr 60
5. *a*, Pottery vessels as uncovered on floor of prehistoric earth-lodge site at 25FT17, Medicine Creek, Nebr. *b*, Excavations at Woodland site 25FT18, at junction of Lime and Medicine Creeks, Nebr 60
6. *a*, View south across excavations at 25FT18, Medicine Creek, Nebr. *b*, Fireplaces, post molds, and miscellaneous small pits at base of Woodland occupation zone, Medicine Creek, Nebr 60

PAGE

7. *a*, Aerial view of Angostura Dam (center foreground) and part of reservoir area beyond, Angostura Reservoir, S. Dak. *b*, Bulldozer of Utah Construction Co. removing sod at start of archeological tests at 39FA10, Angostura Reservoir, S. Dak 60
8. *a*, Workman excavating stone-lined fireplace basin at 39FA9, Angostura Reservoir, S. Dak. *b*, Deep hearth or roasting pit containing burnt stones and sooty soil, exposed during road construction; Angostura Reservoir, S. Dak 60
9. *a*, Excavated tipi ring at 39FA13, Angostura Reservoir, S. Dak. *b*, Refuse beside aboriginal quartzite quarry pits on Flint Hill, 39FA49, near head of Angostura Reservoir, S. Dak 60
10. *a*, View west across Area A at the Long site, 39FA65, Angostura Reservoir, S. Dak. *b*, Excavations at Long site, 39FA65, Area A, Angostura Reservoir, S. Dak 60
11. *a*, Grouped secondary burials as found in Mound 39CH9, formerly situated in spillway line of Fort Randall Dam, Charles Mix County, S. Dak. *b*, Buried archeological zone (line of white stones and bone) exposed in wall of ravine cutting into Missouri River terrace at 39ST23, about 3 miles below Cheyenne River, Oahe Reservoir area, Stanley County, S. Dak 60
12. *a*, Panorama of Oahe Dam site, about 6 miles above Pierre, S. Dak., looking northwest up the Missouri River. *b*, Buffalo Pasture site, 39ST6, showing fortification ditch (arrows); Oahe Reservoir site, S. Dak. *c*, Site 32GT1, on Heart River, showing exploratory trenches; Heart Butte Reservoir, N. Dak 60
13. *a*, Site 39FA10, Trench B, showing archeological remains at various levels; Angostura Dam in background. Fall River County, S. Dak. *b*, East test trench at site 39FA30, on Horsehead Creek, Angostura Reservoir, Fall River County, S. Dak 102
14. *a*, Site 24PR2 at edge of sandstone cliff (foreground); looking southeast toward Powder River and Bitter Creek. Moorhead Reservoir, Montana-Wyoming. *b*, Site 39PE10 (on knoll in foreground), looking west up Moreau River Valley. Bixby Reservoir site, Perkins County, S. Dak 102
15. *a*, Chimney Butte from Manderson-Rockyford Road, with low terrace and site 39SH1 (arrow) in middle distance. Rockyford Reservoir site, Shannon County, S. Dak. *b*, Site 39ST14 (Scotty Phillips Ranch), a fortified Arikara village site in the work area just below Oahe Dam; Stanley County, S. Dak 102

(*Kivett*)

16. *a*, View to southwest toward Woodruff Ossuary, site 14PH4. *b*, Looking northeast across burial pit, site 14PH4, after the removal of plowed soil 142
17. *a*, Looking southeast across burial pit, site 14PH4, showing section walls. *b*, Discoloration which marked feature 1, a pit, at depth of 12 inches, site 14PH4 142
18. *a*, Looking south across burial pit at site 14PH4, after removal of all disturbed soil. *b*, Feature 16, site 14PH4, a partially articulated adult skeleton 142
19. *a*, Feature 8, site 14PH4, an area of scattered human bones showing some articulation. *b*, Feature 9, site 14PH4, a pit filled with disarticulated human bones 142

PAGE
20. *a*, Feature 21, site 14PH4, looking south. *b*, Feature 21, site 14PH4, after removal to the laboratory in a plaster cast 142
21. *a*, View in east area of burial pit, site 14PH4, showing typical disarticulated condition of bones. *b*, Sherds from burial pit, site 14PH4 142
22. *a*, Bone and antler artifacts from site 14PH4. *b*, Stages in manufacture of shell disk beads, site 14PH4 142
23. *a*, Chipped stone artifacts from site 14PH4. *b*, Stone artifacts from site 14PH4 142
24. Artifacts from site 14PH4 142
25. Marine and fresh-water shell ornaments, site 14PH4 142
26. *a*, Artifacts from various sites. *b*, Sherds from Guide Rock Ossuary (site 25WT3) 142
27. Restored vessel of the *Harlan Cord Roughened* type from site 25FR8 142
28. Four views of male skull (14PH4–1436) from Woodruff Ossuary 142

(*Wheat*)

29. Doering site and profile 252
30. Kobs site and view of excavation showing Burial 6 252
31. Pottery, restored vessels 252
32. Pottery, decorated sherds 252
33. Pottery, decorated sherds 252
34. Projectile points: Perdiz Pointed Stem, Scalhorn Stemmed, Eddy Stemmed 252
35. Projectile points: Alba Barbed, Kobs Triangular, and Provisional Types Nos. 1, 2, 3, and 4 252
36. Projectile points: Gary Stemmed points 252
37. Projectile points: Provisional Types Nos. 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and Wells Contracting Stem 252
38. Projectile points: Provisional Types Nos. 15, 16, 17, 18, 19, 20, 21, 22, 23, 24; Pedernales Indented Base, and Clovis Fluted (?) 252
39. Projectile points, unplaced chronologically: Provisional Types Nos. 25, 26, 27, 28, 29, 30, 31, 32; Copena point, Plainview point, and Baird Beveled point 252
40. Knives: Types Nos. 1*a*, 1*b*, 1*c*, 1*d*, 2, and 3 252
41. Knives: Types Nos. 4, 5, 6*a*, and 6*b* 252
42. Scrapers 252
43. Choppers 252
44. Drills, gravers, and eccentric flint 252
45. Ground stone: Atlatl weight, sandstone abraders and saws, milling stone, and handstone 252
46. Miscellaneous minerals and paint pigments 252
47. Artifacts of bone, antler, and shell 252

(*Dick*)

48. *a*, General view of the Hodges site. *b*, Area A at the beginning of excavation 284
49. *a*, Artifacts eroding out of the No. 2/3 fill under the rock fall in the shelter of Area A. *b*, Stratigraphy of section A–4, Area A 284
50. Trench in the remaining fill of Area B 284
51. Projectile points, drills, refined knives, and snub-nose scraper 284
52. Scrapers and rough flake knives 284

PAGE
53. Manos, hammerstone, and choppers 284
54. Fresh-water shells, *Unimerus tetralasmus* Say 284

(*Caldwell*)

55. *a*, Aerial view of the Rembert Mounds location and the accompanying village site. The outlined area indicates the mounds, and the location of the test pits is shown by the black dots in the field below. *b*, Pottery pipes, stone disks, projectile point, and shell beads 320
56. Potsherd types 320

FIGURES

(*Wedel*)

1. Map of Missouri River Basin (heavy broken line), showing reservoir projects investigated by the Missouri River Basin Survey and cooperating agencies as of December 31, 1948 4

(*Kivett*)

2. Plan of Woodruff Ossuary after excavation 110
3. North-south profile across Woodruff Ossuary on E1 line 118

(*Wheat*)

4. Map of general area 153
5. Map of site distribution with inset showing relation of Addicks Dam, Barker Dam, and Houston, Tex 163
6. Sketch map, Addicks "Mound" (42/66A6–1) 164
7. Sketch map, Doering site (42/66A6–2) 168
8. Contour map and plan of excavation, Doering site (42/66A6–2) 169
9. Profiles, Doering site (42/66A6–2) 170
10. Burials, Doering site (42/66A6–2) 172
11. Sketch map, site 42/66A6–4, showing test pits 175
12. Stratigraphic section, site 42/66A6–4 175
13. Sketch map, Kobs site (42/66A6–3) 176
14. Contour map and plan of excavation, Kobs site (42/66A6–3) 177
15. Profiles, Kobs site (42/66A6–3) 179
16. Burials, Kobs site (42/66A6–3) 180
17. Sketch map, Grisbee site (42/66A3-1) 182
18. Stratigraphic section, Grisbee site (42/66A3–1) 183
19. Pottery: Rim and lip profiles 186
20. Pottery: Vessel shapes 187
21. Pottery: Base shapes 188
22. Graph showing comparative projectile-point stratigraphy of Doering and Kobs sites 215
23. Relative chronology of the Addicks Basin sites 243

(*Newman*)

24. Stereograph contour of the skull from Burial 2 258
25. Stereograph contour of the skull from Burial 4 260
26. Stereograph contour of the skull from Burial 5 262
27. Stereograph contour of the skull from Burial 6 262
28. Stereograph contour of the skull from Burial 7 263

(*Dick*)

PAGE
29. Stratigraphy of the trench excavated in Area B 272
30. Plan of Area A showing excavated portion and stratigraphy 273

(*Judson*)

31. Index map showing location of the Hodges and San Jon sites 290
32. Block diagram to show the salient features of the Hodges site 291
33. Generalized section to show the relation of the two erosion surfaces, the inner canyons, and the alluvial formations 293
34. Bar graph to illustrate the relative duration of the various events in the "Alluvial Chronology" 294
35. Diagram to show the relation of the sand (No. 2/3 sand) containing the culture horizon to the other deposits at the Hodges site 296

(*Caldwell*)

36. C. C. Jones' map of the Rembert mounds 308
37. Map showing test pits and wash-outs in the vicinity of the large mound remnant 311
38. Profile of the large mound, adapted from Thomas 312
39. Section through large mound, adapted from Thomas 312
40. Profiles of test pits in the large mound and vicinity 313

FOREWORD

The Inter-Agency program for the recovery of archeological and paleontological remains which would otherwise be lost as a result of the numerous projects for flood control, irrigation, hydroelectric installations, and navigation improvements in the river basins of the United States got under way in 1946 as a cooperative effort on the part of the Smithsonian Institution, the National Park Service, the Bureau of Reclamation, and the Corps of Engineers of the United States Army. Preliminary steps taken over a period of many months by the Smithsonian Institution and the National Park Service resulted at that time in allotments of funds from the Bureau of Reclamation and the Corps of Engineers to initiate preliminary surveys in the Missouri Basin and other areas throughout the country. Subsequently all of the funds for carrying on the work have been provided by the Department of the Interior through its Bureau of Reclamation and National Park Service, although the Corps of Engineers has continued to cooperate in other ways. The National Park Service has served as the liaison between the various agencies and has provided the Smithsonian Institution with all of the necessary information pertaining to the locations of the proposed dams and reservoirs and their priorities. It also has carried the responsibility for budgeting the costs of the program.

Through a Memorandum of Understanding between the Smithsonian Institution and the National Park Service, the Smithsonian Institution assumed responsibility for the actual field investigations. To that end the River Basin Surveys was established as a unit of the Bureau of American Ethnology and has operated both survey and excavation parties throughout the country. In carrying on this work many local and State institutions have given valuable cooperation and have assumed responsibility for various projects.

Preliminary surveys are made in the areas to be inundated or otherwise disturbed by the construction projects. All archeological sites found during the course of such surveys are recorded and those that appear worthy of further study or that cannot be duplicated elsewhere are recommended for excavation. Excavations are carried on at projects where construction is already under way or is soon to start. The surveys have located a wide variety of sites ranging from those occupied by primitive hunting groups thousands of years ago through subsequent stages of aboriginal cultural development to villages inhabited by Indians at the time the first exploring parties reached those areas. The surveys also have located historic sites of the early settlement periods in various parts of the United States and they, as well as aboriginal locations, are being investigated. The historic phase of the program is in conjunction with the work of the History Division of the National Park Service.

Since July 1946, when the first reconnaissance parties went into the field, 213 reservoir areas located in 28 States have been surveyed. Archeological sites located and recorded have reached a total of 2,350, of which some 500 have been recommended for excavation or additional testing. Excavations have been carried on by the River Basin Surveys at 36 sites in 15 reservoir areas in 9 States. Preliminary reports and summary articles pertaining to the results have appeared in various journals. More detailed reports are now being completed and those contained in the present volume are the first of what should be a long series of papers.

Frank H. H. Roberts, Jr.,
Director, River Basin Surveys.

SMITHSONIAN INSTITUTION
Bureau of American Ethnology
Bulletin 154

River Basin Surveys Papers, No. 1

Prehistory and the Missouri Valley Development Program

Summary Report on the Missouri River Basin Archeological Survey in 1948

By WALDO R. WEDEL

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CONTENTS

PAGE
Introduction 1
Personnel 8
Laboratory activities 8
Field work and explorations 11
Nebraska 12
North Dakota 19
South Dakota 20
Wyoming 29
Field work in paleontology 31
Field work by cooperating agencies 33
Kansas 34
Nebraska 38
Archeological reconnaissance in the Lower Platte Basin 43
North Dakota 46
Résumé and conclusions 48

ILLUSTRATIONS

PLATES

1. Aerial view of Medicine Creek dam site, looking upstream 60
2. Aerial view of Medicine Creek dam site (construction area at top), looking downstream 60
3. *a*, Aerial view of excavations at 25FT17, Medicine Creek, Nebr. *b*, Excavating a prehistoric house site at 25FT17, Medicine Creek, Nebr.
4. *a*, View southeast across excavations at 25FT70, Medicine Creek, Nebr. *b*, Prehistoric house sites and other features uncovered at 25FT70, Medicine Creek, Nebr 60
5. *a*, Pottery vessels as uncovered on floor of prehistoric earth-lodge site at 25FT17, Medicine Creek, Nebr. *b*, Excavations at Woodland site 25FT18, at junction of Lime and Medicine Creeks, Nebr 60
6. *a*, View south across excavations at 25FT18, Medicine Creek, Nebr. *b*, Fireplaces, post molds, and miscellaneous small pits at base of Woodland occupation zone, Medicine Creek, Nebr 60
7. *a*, Aerial view of Angostura dam (center foreground) and part of reservoir area beyond, Angostura Reservoir, S. Dak. *b*, Bulldozer of Utah Construction Co. removing sod at start of archeological tests at 39FA10, Angostura Reservoir, S. Dak 60
8. *a*, Workmen excavating stone-lined fireplace basin at 39FA9, Angostura Reservoir, S. Dak. *b*, Deep hearth or roasting pit containing burnt stones and sooty soil, exposed during road construction; Angostura Reservoir, S. Dak 60
9. *a*, Excavated tipi ring at 39FA13, Angostura Reservoir, S. Dak. *b*, Refuse beside aboriginal quartzite quarry pits on Flint Hill, 39FA49, near head of Angostura Reservoir, S. Dak 60
10. *a*, View west across Area A, at the Long Site 39FA65, Angostura Reservoir, S. Dak. *b*, Excavations at Long Site, 39FA65, Area A, Angostura Reservoir, S. Dak 60

PAGE

11. *a*, Grouped secondary burials as found in Mound 39CH9, formerly situated in spillway line of Fort Randall Dam, Charles Mix County, S. Dak. *b*, Buried archeological zone (line of white stones and bone) exposed in wall of ravine cutting into Missouri River terrace at 39ST23, about 3 miles below Cheyenne River, Oahe Reservoir area, Stanley County, S. Dak ---------- 60
12. *a*, Panorama of Oahe dam site, about 6 miles above Pierre, S. Dak., looking northwest up the Missouri River. *b*, Buffalo Pasture site, 39ST6, showing fortification ditch (arrows); Oahe Reservoir site, S. Dak. *c*, Site 32GT1, on Heart River, showing exploratory trenches; Heart Butte Reservoir, N. Dak ---------- 60

FIGURE

1. Map of Missouri River Basin (heavy broken line), showing reservoir projects investigated by the Missouri River Basin Survey and cooperating agencies as of December 31, 1948 ---------- 4

PREHISTORY AND THE MISSOURI VALLEY DEVELOPMENT PROGRAM

SUMMARY REPORT ON THE MISSOURI RIVER BASIN ARCHEOLOGICAL SURVEY IN 1948

By Waldo R. Wedel

INTRODUCTION

The Missouri River Basin Survey of the Smithsonian Institution, organized in 1946, continued during calendar year 1948 its archeological and paleontological investigations at Federal water-control projects throughout the watershed of the Missouri. The present report, third in a continuing series, briefly reviews the year's activities in field and laboratory. Although primarily concerned with the work of the River Basin Surveys, it includes also summary statements on the researches of various State agencies cooperating in recovery of scientific materials that might otherwise be lost because of the water-control program. As in previous yearly summaries, this one makes no pretense at complete and final coverage of accomplishments during the period involved. Neither should it be regarded as necessarily representing the opinions and judgments of the staff members and others on whose findings in field and laboratory it is very largely based. It is, in short, a statement of progress during calendar year 1948, at the end of 2½ years of sustained work. To that statement have been added certain preliminary generalizations regarding the significance of the findings in the over-all picture of native human history in the Great Plains and nearby regions.

It is unnecessary to discuss in detail here the general background, organization, and purposes of the Missouri River Basin Survey, since these matters have been adequately set forth elsewhere.[1] Briefly, the project is one phase of a Nation-wide archeological and paleontological salvage program administered by the Smithsonian Institution and actively directed by Dr. F. H. H. Roberts, Jr., Bureau of American Ethnology. This program is based on a memorandum of understanding, dated 1945, between the Smithsonian Institution and the National Park Service, and on a series of interbureau agreements between the National Park Service, the Bureau of Reclamation, and the Corps of Engineers. Its purpose is to locate, record, and evaluate the archeological and paleontological materials that will be affected by each of more than 100 Federal water-control projects proposed or under construction by the Bureau of Reclamation and the Corps of Engineers; to transmit this information to the National Park Service, along with such recommendations for further action as seem necessary to recover a representative sample of the scientific data which are about to be lost; and to direct the Federal phases of any subsequent recovery work undertaken, including limited or comprehensive excavation at key sites. Financial support is provided by the Bureau of Reclamation through the National Park Service.

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[1] See Smithsonian Misc. Coll., vol. 107, No. 6, Apr. 23, 1947; and Amer. Antiq., vol. 12, No. 4, pp. 209–225, April 1947.

In carrying forward the enormous task set for it, the Missouri River Basin Survey has been materially aided by various organizations, agencies, and individuals. Only a few of these can be singled out at this time for special mention. In the Missouri River Basin Recreation Survey office, Region 2, National Park Service, Chief Recreation Planner Guy D. Edwards and Archeologist J. D. Jennings continued their helpful and stimulating interest in all phases of the archeological recovery program. The Bureau of Reclamation, besides providing funds to support the work, has freely supplied maps, engineering data, construction programs and schedules, and other materials on request. Furthermore, as is noted elsewhere in this report, the Bureau took the initiative in setting up the highly successful cooperative excavation program at Medicine Creek, Nebr.—a pattern of operation that for efficiency and productiveness might well be followed at other projects where archeological and paleontological materials are directly threatened by dam construction. The Corps of Engineers has continued to provide maps and other project data; and in the Omaha district office, T. E. Huddleston has remained an unofficial but extremely helpful consultant in interpretation of aerial photographs and in other problems pertaining to pre-excavation archeological work on the Missouri River in North and South Dakota. Local, district, and regional officials and personnel of these and other agencies, project engineers, representatives of construction companies, and many private individuals have extended innumerable courtesies to River Basin Surveys field parties and to the local Survey office in Lincoln. The same is true of State and other non-Federal agencies with whom contacts were made. Especially to be noted in this regard is the generous cooperation of the University of Nebraska in continuing to provide, in its Laboratory of Anthropology, working space for the Survey. The active support and direct interest of the Committee for Recovery of Archeological Remains, representing the archeological profession and various learned societies, must also be acknowledged.

The general procedure by which the investigative work of the River Basin Surveys is programmed consists of three phases. The first is reconnaissance, in which the primary objective is to get a working familiarity with proposed or potential reservoir areas and their archeological or paleontological possibilities. The second is intensive survey, wherein there is complete coverage of the reservoir area and limited testing, if possible, of the more promising sites located. The third is comprehensive excavation which, depending upon various factors, may mean either the complete working out of certain sites or else the large-scale but not complete clearing of a series of key sites. These three phases, of course, are not mutually exclusive; and as the backlog of proposed reservoirs awaiting examination dwindles and adequate funds become available, it may be possible to intensify the initial survey and then move directly into such excavation as seems warranted.

From its inception in 1946 until the end of 1947, the field activities of the Missouri River Basin Survey were restricted mainly to preliminary reconnaissance and some follow-up surveys. No funds were available for extended excavations, although a small allotment in fiscal year 1948 made possible limited excavations late in 1947 at Boysen ,Wyo., and in 1948 at Angostura, S. Dak., and Heart Butte, N. Dak. Early in 1948, at the suggestion of officials of the Bureau of Reclamation, a major excavation program was set in motion at Medicine Creek, Nebr. Because this work was of an emergency character, funds originally programmed by the Missouri River Basin Survey for other projects were reallocated for supervisory and other costs in connection with the operations at Medicine Creek. This unexpected drain on already inadequate funds was followed in July 1948 by a reduced allotment for fiscal year 1949 and then by a pay increase for classified staff personnel. Thus, the Missouri River Basin Survey went through calendar year 1948 with operating costs substantially increased and funds available materially reduced in amount. As a result, field work went forward on a smaller scale than originally planned and a portion of the professional staff could not be sent into the field. Except at Medicine Creek, no comprehensive excavation was possible in 1948.

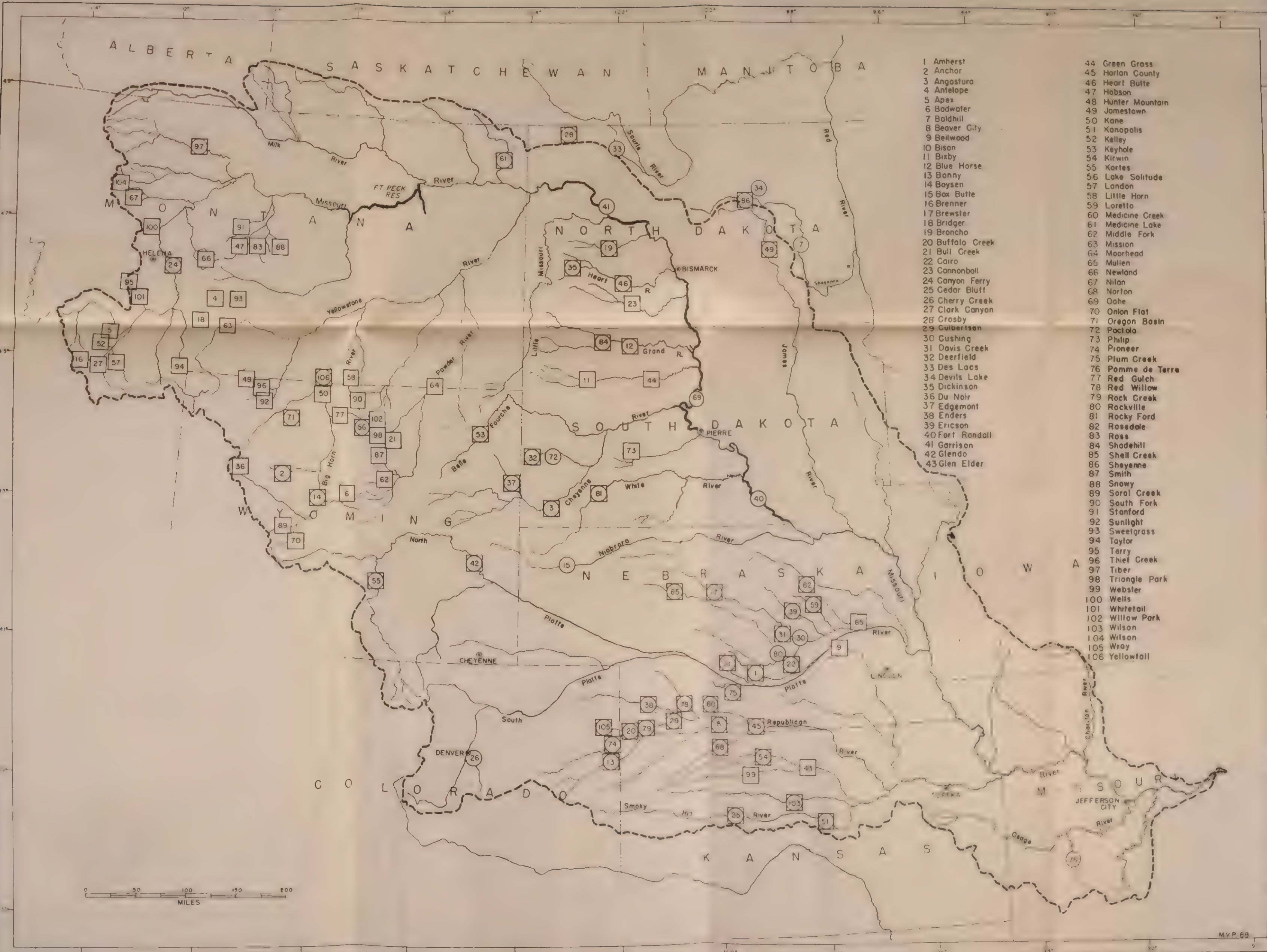
It may be appropriate to note at this point one of the major obstacles to effective programming of field work on this project. For various reasons, including seasonal climatic, labor, and other factors, the most satisfactory period for archeological work is between, approximately, April and October. This period begins in the last quarter of an expiring fiscal year and runs into or through the first quarter of the next.

It represents an interval during much of which there is uncertainty regarding the amount of funds to be allotted for the new fiscal year beginning on July 1, and also as to the date on which those funds will be available. If enough carry-over funds are held back to insure completion of field-work begun not long before the close of one fiscal year, there is an excellent prospect that the amount of the carry-over will be deducted from the next year's allotment. All of this means that annually at the very time when an all-out summer field program should be in the making, dwindling funds and the uncertainty regarding their replenishment exert a strong restraining influence on the planning and carrying out of field work.

During calendar year 1948, eight reservoir areas were visited by River Basin Surveys field parties in search of archeological remains, and 194 sites were added to the preceding year's total in the Surveys files. The University of Nebraska Laboratory of Anthropology investigated five other proposed reservoir areas and located 34 sites. Information on the archeological resources of Davis Creek Reservoir area was provided by the Nebraska State Historical Society from its files, making unnecessary for the present any field surveys in that locality. By year's end, the River Basin Surveys and cooperating agencies had visited, partially or completely surveyed, and appraised as to archeological materials 57 Bureau of Reclamation and 9 Corps of Engineers projects, and had on record a total of 877 sites of archeological interest. Projects visited were distributed throughout the Missouri Basin as follows: Colorado, 4; Kansas, 6; Missouri, 1; Montana, 4; Nebraska, 23; North Dakota, 11; South Dakota, 9; Wyoming, 8.

Paleontological investigations by the River Basin Surveys during 1948 consisted of re-examination and collecting at four reservoir sites previously examined; no new localities were visited. The University of Nebraska State Museum, a cooperating institution, re-examined two localities previously worked. By the end of 1948, a paleontological reconnaissance and collecting had been done by the River Basin Surveys at 97 reservoir sites, including 93 Bureau of Reclamation and 4 Corps of Engineers projects. These were distributed as follows, by States: Colorado, 3; Kansas, 7; Montana, 25; Nebraska, 23; North Dakota, 10; South Dakota, 6; Wyoming, 23.

In table 1 below are summarized the reservoir projects investigated by archeological and paleontological field parties of the Missouri River Basin Survey and by cooperating agencies up to December 31, 1948. In the pages that follow are briefly described the field operations and some of the findings during calendar year 1948; additional details concerning some of these explorations may be found in American Antiquity, volume 14, No. 4, part 1, April 1949. Reviews of scientific salvage operations in preceding years will be found in the summary reports of the Missouri Basin Survey for 1946 and 1947, published by the Smithsonian Institution.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14 Boysen
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17 Brewster
18 Bridger
19 Broncho
20 Buffalo Creek
21 Bull Creek
22 Cairo
23 Cannonball
24 Canyon Ferry
25 Cedar Bluff
26 Cherry Creek
27 Clark Canyon
28 Crosby
29 Culbertson
30 Cushing
31 Davis Creek
32 Deerfield
33 Des Lacs
34 Devils Lake
35 Dickinson
36 Du Noir
37 Edgemont
38 Enders
39 Ericson
40 Fort Randall
41 Garrison
42 Glendo
43 Glen Elder
44 Green Grass
45 Harlan County
46 Heart Butte
47 Hobson
48 Hunter Mountain
49 Jamestown
50 Kane
51 Kanopolis
52 Kelley
53 Keyhole
54 Kirwin
55 Kortes
56 Lake Solitude
57 London
58 Little Horn
59 Loretto
60 Medicine Creek
61 Medicine Lake
62 Middle Fork
63 Mission
64 Moorhead
65 Mullen
66 Newland
67 Nilan
68 Norton
69 Oahe
70 Onion Flat
71 Oregon Basin
72 Pactola
73 Philip
74 Pioneer
75 Plum Creek
76 Pomme de Terre
77 Red Gulch
78 Red Willow
79 Rock Creek
80 Rockville
81 Rocky Ford
82 Rosedale
83 Ross
84 Shadehill
85 Shell Creek
86 Sheyenne
87 Smith
88 Snowy
89 Sorol Creek
90 South Fork
91 Stanford
92 Sunlight
93 Sweetgrass
94 Taylor
95 Terry
96 Thief Creek
97 Tiber
98 Triangle Park
99 Webster
100 Wells
101 Whitetail
102 Willow Park
103 Wilson
104 Wilson
105 Wray
106 Yellowtail

FIGURE 1.—Map of Missouri River Basin (heavy broken line), showing reservoir projects investigated by the Missouri River Basin Survey and cooperating agencies as of December 31, 1948. Numbers designating projects correspond to those in column 1 of table 1. Circles indicate archeological investigation; boxes indicate paleontological examination; boxed circles indicate archeological and paleontological investigations.

TABLE 1.—*Missouri Basin reservoir sites investigated by the Smithsonian Institution River Basin Surveys and cooperating agencies through first half of fiscal year 1949 (to end of calendar year 1948). Numbers in first column correspond to numbers on location map (fig. 1). Sixth column indicates whether investigations were archeological* (A), *paleontological* (P), *or both* (A, P)

No.	Project	Stream	County	State	Surveys	Archeological sites recorded			
						FY 47	FY 48	FY 49	Total
1	Amherst	Wood River	Buffalo	Nebr.	A, P	5			5
2	Anchor	South Fork, Owl Creek	Hot Springs	Wyo.	A, P	3			3
3	Angostura	Cheyenne River	Fall River	S. Dak.	A, P	5		66	71
4	Antelope	Shields River, offstream	Park	Mont.	P				
5	Apex	Birch Creek	Beaverhead	Mont.	P				
6	Badwater	Badwater Creek	Fremont	Wyo.	P				
7	Baldhill	Sheyenne River	Barnes, Griggs	N. Dak.	A, P		10		10
8	Beaver City	Beaver Creek	Furnas	Nebr.	A, P	4			4
9	Bellwood	Clear Creek	Polk	Nebr.	A, P		0		0
10	Bison (formerly Buffalo Creek).	Buffalo Creek	Dawson	Nebr.	A, P	1			1
11	Bixby	Moreau River	Perkins	S. Dak.	P				
12	Blue Horse	Grand River	Corson	S. Dak.	A, P	0			0
13	Bonny	South Fork, Republican River	Yuma	Colo.	A, P	3			3
14	Boysen	Big Horn River	Fremont	Wyo.	A, P	15	60		75
15	Box Butte	Niobrara River	Dawes	Nebr.	A	1			1
16	Brenner	Horse Prairie Creek	Beaverhead	Mont.	P				
17	Brewster	North Loup River	Blaine	Nebr.	A, P	1			1
18	Bridger	Bridger Creek	Gallatin	Mont.	P				
19	Broncho	Knife River	Dunn, Mercer	N. Dak.	A, P	9			9
20	Buffalo Creek	Buffalo Creek	Dundy	Nebr.	A, P	1			1
21	Bull Creek	Clear Creek	Johnson	Wyo.	P				
22	Cairo	Dry Creek	Hall	Nebr.	A, P	0			0
23	Cannonball	Cannonball River	Grant	N. Dak.	P				
24	Canyon Ferry	Missouri River	Broadwater, Lewis and Clark	Mont.	A, P	7	26		33
25	Cedar Bluff	Smoky Hill River	Trego	Kans.	A, P	4			4
26	Cherry Creek	Cherry Creek	Arapahoe	Colo.	A	6			6
27	Clark Canyon	Beaverhead River	Beaverhead	Mont.	P				
28	Crosby	Missouri River, offstream	Divide	N. Dak.	A, P	1			1
29	Culbertson	Republican River	Hitchcock	Nebr.	A, P	1			1
30	Cushing	Spring Creek	Greeley, Howard	Nebr.	A, P			7	7
31	Davis Creek	Davis Creek	Greeley, Howard, Sherman, Valley	Nebr.	A, P				16
32	Deerfield	Rapid Creek	Pennington	S. Dak.	A, P	0			0
33	Des Lacs	Des Lacs River	Ward	N. Dak.	A	0			0
34	Devils Lake	Devils Lake	Ramsey	N. Dak.	A	5			5
35	Dickinson	Heart River	Stark	N. Dak.	A, P	3		0	3
36	Du Noir	Wind River	Fremont	Wyo.	P				

TABLE 1.—*Missouri Basin reservoir sites investigated by the Smithsonian Institution River Basin Surveys and cooperating agencies through first half of fiscal year 1949 (to end of calendar year 1948). Numbers in first column correspond to numbers on location map (fig. 1). Sixth column indicates whether investigations were archeological* (A), *paleontological* (P), *or both* (A, P)—Continued

No.	Project	Stream	County	State	Surveys	Archeological sites recorded			
						FY 47	FY 48	FY 49	Total
37	Edgemont	Beaver Creek	Weston	Wyo	A, P			28	28
38	Enders	Frenchman Creek	Chase	Nebr	A, P	4			4
39	Ericson	Cedar River	Greeley, Wheeler	Nebr	A, P	5			5
40	Fort Randall	Missouri River	Brule, Buffalo, Charles Mix, Gregory, Hughes, Hyde, Lyman.	S. Dak	A		93		93
41	Garrison	Missouri River	Dunn, McKenzie, McLean, Mercer, Mountrail, Williams.	N. Dak	A	70			70
42	Glendo	North Platte River	Platte	Wyo	A, P	43			43
43	Glen Elder	Solomon River	Mitchell	Kans	P				
44	Green Grass	Moreau River	Dewey	N. Dak	P				
45	Harlan County	Republican River	Harlan	Nebr	A, P	23			23
46	Heart Butte	Heart River	Grant	N. Dak	A, P	4		9	13
47	Hobson	Judith River	Judith Basin	Mont	P				
48	Hunter Mountain	Clark Fork	Park	Wyo	P				
49	Jamestown	James River	Stutsman	N. Dak	A, P	7			7
	Johnson Siding (see Pactola).	Rapid Creek	Pennington	S. Dak				0	0
50	Kane	Big Horn River	Big Horn	Wyo	P				
51	Kanopolis	Smoky Hill River	Ellsworth	Kans	A, P	18			18
52	Kelley	Rattlesnake Creek	Beaverhead	Mont	P				
53	Keyhole	Belle Fourche River	Crook	Wyo	A, P			29	29
54	Kirwin	North Fork, Solomon River	Phillips	Kans	A, P	1			1
55	Kortes	North Platte River	Carbon	Wyo	A, P	1			1
56	Lake Solitude	Paintrock Creek	Big Horn	Wyo	A, P	0			0
57	Landon	Blacktail Creek	Beaverhead	Mont	P				
58	Little Horn	Little Horn River	Big Horn	Mont	P				
59	Loretto	Beaver Creek	Boone	Nebr	A, P			7	7
60	Medicine Creek	Medicine Creek	Frontier	Nebr	A, P	18	11		29
61	Medicine Lake	Big Muddy Creek	Roosevelt, Sheridan	Mont	A, P	8			8
62	Middle Fork	Middle Fork, Powder River	Johnson	Wyo	P				
63	Mission	Yellowstone River	Park	Mont	P				
64	Moorhead	Powder River	Powder River, Campbell	Mont., Wyo	P				
65	Mullen	Middle Loup River	Hooker	Nebr	A, P	8			8
66	Newland	Newland Creek	Meagher	Mont	P				
67	Nilan	South Fork, Sun River	Lewis and Clark	Mont	P				
68	Norton	Prairie Dog Creek	Norton	Kans	A, P	3			3

69	Oahe (Fort Pierre-Cheyenne River).	Missouri River	Armstrong, Campbell, Corson, Dewey, Hughes, Potter, Stanley Sully, Walworth; Burleigh, Emmons, Morton, Sioux.	S. Dak. N. Dak.	A			61	61
70	Onion Flat	Little Popo Agie River	Fremont	Wyo.	P				
71	Oregon Basin	Shoshone River, offstream	Park	Wyo.	A, P	7	21		28
72	Pactola (Johnson Siding Alternate).	Rapid Creek	Pennington	S. Dak.	A			1	1
73	Philip	North Fork, Bad River	Haakon	N. Dak.	P				
74	Pioneer	Arikaree River	Yuma	Colo.	A, P	1			1
75	Plum Creek	Plum Creek	Gosper	Nebr.	A, P			9	9
76	Pomme de Terre	Pomme de Terre River	Hickory, Polk	Mo.	A	25			25
77	Red Gulch	Shell Creek	Big Horn	Wyo.	P				
78	Red Willow	Red Willow Creek	Frontier, Hayes	Nebr.	A, P	5			5
79	Rock Creek	Rock Creek	Dundy	Nebr.	A, P	1			1
80	Rockville	Middle Loup River	Sherman	Nebr.	A, P	0			0
81	Rocky Ford	White River	Shannon	S. Dak.	A, P		1		1
82	Rosedale	Clearwater Creek	Antelope, Holt	Nebr.	A, P			11	11
83	Ross	Ross Fork	Judith Basin	Mont.	P				
84	Shadehill	Grand River	Perkins	S. Dak.	A, P	6			6
85	Shell Creek	Shell Creek	Colfax, Platte	Nebr.	P				
86	Sheyenne	Sheyenne River	Barnes, Griggs	N. Dak.	A, P	11			11
87	Smith	North Fork Powder River	Johnson	Wyo.	P				
88	Snowy	Cottonwood Creek	Fergus	Mont.	P				
89	Soral Creek	North Fork, Popo Agie Creek	Fremont	Wyo.	P				
90	South Fork	South Fork, Tongue River	Sheridan	Wyo.	P				
91	Stanford	Skull Creek	Judith Basin	Mont.	P				
92	Sunlight	Sunlight Creek	Park	Wyo.	P				
93	Sweetgrass	Sweetgrass Creek	Sweetgrass	Mont.	P				
94	Taylor	Taylor Fork, Gallatin River	Gallatin	Mont.	P				
95	Terry	Boulder River	Jefferson	Mont.	P				
96	Thief Creek	Clark Fork	Park	Wyo.	P				
97	Tiber	Marias River	Liberty, Toole	Mont.	A, P	18	35		53
98	Triangle Park	Rock Creek	Johnson	Wyo.	P				
99	Webster	South Fork, Solomon River	Rooks	Kans.	P				
100	Wells	Rock Creek	Lewis and Clark	Mont.	P				
101	Whitetail	Whitetail Creek	Jefferson	Mont.	P				
102	Willow Park	South Fork, Piney Creek	Johnson	Wyo.	P				
103	Wilson	Saline River	Russell	Kans.	A, P	6			6
104	Wilson	North Fork, Sun River	Lewis and Clark	Mont.	P				
105	Wray	North Fork, Republican River	Yuma	Colo.	A, P	5			5
106	Yellowtail	Big Horn River	Big Horn, Carbon, Big Horn	Mont., Wyo.	A, P	3			3
	Total					376	257	228	877

PERSONNEL

No changes were made in the professional staff of the Missouri River Basin Survey during 1948, but owing to shortage of funds and increased operating costs, steps were being taken at year's end for a staff reduction. On active duty throughout the year were six archeologists: Paul L. Cooper, temporarily in charge of the field office during the writer's absences in Washington; Robert B. Cumming, Jr., laboratory supervisor; Wesley L. Bliss; Marvin F. Kivett; J. J. Bauxar; and Jack T. Hughes. As in the preceding year, Dr. T. E. White, on leave of absence from the Museum of Comparative Zoology, Harvard University, carried on the paleontological phases of the Missouri River Basin Survey salvage work. He was in Lincoln, or on field assignment out of Lincoln, from May 18 until November 5.

Full-time office and laboratory personnel included Mrs. Ina May Reagan, clerk-stenographer; Dean Clark and A. E. Nixon, laboratory assistants; J. M. Shippee, expert laborer; and George Metcalf, field and laboratory assistant. One full-time and one part-time temporary office assistant were added to the clerical force during the year. Drafting of maps and diagrams, some of the routine processing of specimens, and the maintenance of certain office and laboratory files were carried on with part-time student and other assistance.

Student assistants were again employed wherever possible as members of the field parties. Robert L. Hall and Warren Wittry, University of Wisconsin, joined Mr. Cooper at Heart Butte on June 22, and remained with the party until early September. Gordon F. McKenzie, University of Nebraska, was with this unit from August 1 to September 3. Dr. White was assisted in Wyoming and Montana by Ernest Lundelius, University of Texas, from June 1 to September 3, and by John C. Donohoe, Montana State College, from June 14 to August 1. Miss Dorothy E. Fraser participated as special consultant in field investigations in the Fort Bennett, S. Dak., locality with the Cooper party during the month of August.

LABORATORY ACTIVITIES

The field headquarters and laboratory for the Missouri River Basin Survey were located throughout the year in the Laboratory of Anthropology at the University of Nebraska. Until the end of September, space was provided for these facilities in the basement of Love Memorial Library. Thereafter, more spacious and better-lighted quarters designed primarily for anthropological research and training were made available in the basement of the newly completed Burnett Hall. As in the preceding year, storage space at the Lincoln Municipal Airport was utilized for housing the Survey's 11 vehicles, field equipment and supplies, and certain specimens. As previously, also, additional laboratory and study space was generously provided for Survey personnel by the Nebraska State Historical Society.

The basic project files were maintained and expanded throughout the year. At year's end, the basic site file included 635 site folders, each containing a site survey sheet prepared in the field, a catalog of artifacts collected and photographs made, and other data relevant to the particular location. This represents an increase of 192 over the total at the end of 1947. All of the material in the basic site file has also been duplicated in reserve files.

The map file, which includes topographic, geologic, land survey, ownership, and other maps needed for reference and planning purposes, was augmented by 101 additional sheets during the year. It now includes approximately 667 maps. Many of these were furnished by the construction agencies and by other State and Federal offices, as requested from time to time; others were purchased as needed. There are also 295 aerial photographs, most of them on a scale of 1:12000. They cover much of the main-stem area along the Missouri River between Pierre, S. Dak., and the North Dakota State line, as well as smaller areas on Medicine Creek, about Angostura, and elsewhere.

Drafting and map-making have been pushed steadily, but almost wholly with part-time student assistance. Archeological site maps, reservoir site location charts, archeological and geological profiles, and house plans to the number of 24 had been prepared by the end of December.

The addition of a full-time laboratory assistant in the darkroom in June has vastly facilitated the preparation of specimen photographs, the processing of field and laboratory negatives, and the photographic duplication of office and laboratory records. Darkroom work during calendar 1948 includes the processing of 1,087 negatives of field and laboratory photographs; preparation of 1,562 black and white prints for reference files and illustrative purposes; preparation of 121 2 x 2 black-and-white slides; cataloging and filing of 373 color transparencies, most of them in 35-mm. size; and the preparation of 262 photographic enlargements in 8 x 10-inch size for publicity and reference uses.

An ethnohistorical reference file begun late in 1947 was continued through 1948. At year's end this included 5,202 cards carrying classified information on the early documentary sources for the Missouri Basin Indians. Emphasis was on the native tribes residing formerly along the main stem and the references to them by European and American explorers up to the beginning of the nineteenth century.

With the beginning of comprehensive excavation, the handling and storage of specimens has become a major activity. By the end of 1948, nearly 100,000 specimens had been cleaned, cataloged, and stored.

Slightly more than half of these were accumulated during the calendar year. The restoration of outstanding or representative pieces and their preparation for eventual study and exhibit has gone forward on a small scale. It should be noted that the great bulk of specimens now on hand are primarily of study interest; they include much broken and fragmentary material which will be discarded when no longer needed for analysis and report writing. Under present laboratory procedures, all materials sent in from the field by archeological parties are processed and cataloged, so as to facilitate their study. Only a relatively small fraction of the collections now on hand will eventually find their way into National, State, and local institutions.

As in the previous year, the Missouri River Basin Survey furnished to the National Park Service preliminary mimeographed appraisals of the archeological and paleontological resources of reservoirs investigated. For those reservoir areas where intensive survey was subsequently made, supplementary appraisals have been furnished. These appraisals consist of site location maps, summary descriptions of materials seen, and an evaluation of the probable scientific importance of the remains located. Where further investigation is believed to be needed, an estimate of the nature and extent of such additional work is also included. These reports are distributed by the National Park Service to the construction agencies, to district and regional offices of the various Federal agencies concerned, and on a selective basis to cooperating State and other institutions and organizations where their particular fields of interest are concerned.

During calendar year 1948, preliminary appraisals on archeological resources of 11 reservoir sites were prepared and distributed. These include Baldhill and Garrison in North Dakota; Beaver City, Bonny, Buffalo Creek, Culbertson, Norton, Pioneer, Red Willow, and Rock Creek in the Republican River Basin of Colorado, Kansas, and Nebraska; and Wilson Reservoir site in the Smoky Hill Basin of northern Kansas. Supplementary appraisals were distributed for Boysen, Glendo, and Oregon Basin, in Wyoming; and for Canyon Ferry and Tiber, in Montana. In addition, a memorandum on Cheyenne River Basin archeology, including Angostura, Edgemont, Johnson Siding, Keyhole, and Pactola Reservoir sites in southwestern South Dakota and northeastern Wyoming, was furnished the National Park Service.

In preparation was a preliminary appraisal of the Davis Creek Reservoir site, Nebraska, based on archeological work by the Nebraska State Historical Society and Works Project Administration in 1939; and several longer reports of more technical nature. These latter included a report on certain discoveries in the fall of 1946 at Harlan County Reservoir site; and one on Birdshead Cave in the Boysen Reservoir site, Wyoming. Late in the year, members of the field staff were beginning to turn their attention to the preparation of technical summaries on the 1948 field work at Medicine Creek, Angostura, and lower Oahe Reservoir sites. These summaries were published in the April 1949 issue of American Antiquity, which is devoted entirely to papers dealing with the Missouri Basin work of the River Basin Surveys and cooperating State agencies.

In addition to the various archeological reports noted above, a 71-page appraisal of the paleontological resources of certain river basins and reservoir sites in the Missouri watershed was also distributed. This covers 70 reservoir sites, potential, proposed, and under construction, in Nebraska, North and South Dakota, Montana, and Wyoming. Not distributed were reports prepared by the paleontologist on Boysen, Canyon Ferry, and Cedar Bluff Reservoir sites, and a preliminary statement on the physiographic history of Horsehead Creek in the vicinity of Site 39FA65, in Angostura Reservoir, South Dakota.

In November, the Smithsonian Institution published a summary report prepared by the field director on the activities of the Missouri River Basin Survey during calendar year 1947.

As in preceding years, the Lincoln office of the River Basin Surveys furnished information, as requested, to the daily press, to technical and semipopular periodicals, and to various other agencies and individuals. In the field, archeologists at various times addressed local civic and other groups interested in the prehistory of their particular localities. Especially gratifying in this connection was the sustained public interest shown in the excavations at Medicine Creek, where illustrated talks by the archeologist in charge became a semiweekly part of his duties.

Several staff members participated in various ways in the sessions of the Sixth Plains Archeological Conference, held at the University of Nebraska, in Lincoln, November 25–27, 1948.

FIELD WORK AND EXPLORATIONS

During calendar year 1948, field work was carried on by five units representing the River Basin Surveys. Four of these were concerned with archeological researches, the fifth with paleontology. Archeological projects included the following: comprehensive archeological excavations for 4½ months at Medicine Creek Reservoir site, under the direction of M. F. Kivett; 3½ months of reconnaissance and intensive survey at five reservoir sites in the Cheyenne River Basin in northeastern Wyoming and southwestern South Dakota, under Jack T. Hughes; 6 weeks of test excavations at Heart Butte, N. Dak., and a like period in the lower Oahe Reservoir site, South Dakota, under Paul L. Cooper; and 2 weeks of mound excavation in the vicinity of Fort Randall Dam, South Dakota, also by Mr. Cooper. The paleontological unit, under Dr. T. E. White, divided 4 months of field activities among Boysen (Wyo.), Canyon Ferry (Mont.), Angostura (S. Dak.), and Cedar Bluff, (Kans.) Reservoir sites. Further details regarding these various projects are given below.

Another staff archeologist, J. J. Bauxar, was detailed at request of the Regional Director, Region 2, to the National Park Service from April 5 to June 26 for archeological researches at Homestead National Monument, Gage County, Nebr. W. L. Bliss spent approximately one week in August assisting in archeological excavations by the University of Nebraska State Museum in Medicine Creek Reservoir, Nebraska.

NEBRASKA

Medicine Creek Reservoir site.—Of outstanding interest in the year's program were the comprehensive archeological excavations conducted during the summer at Medicine Creek Reservoir site in southern Nebraska. A preliminary reconnaissance here by M. F. Kivett and J. M. Shippee during the summer of 1946 had disclosed the location of 15 archeological sites within the future pool area. In 1947, following the disastrous flood of June 21–22 on Medicine Creek, Bureau of Reclamation plans for construction of the dam and reservoir were speeded up. Accordingly, the River Basin Surveys assigned Mr. Kivett, with George Metcalf as assistant, to approximately 2 months of further survey and limited excavations at and near the dam site, at points that seemed likely to be affected soon by construction activities. This work, a continuation of investigations begun some time previously by the Nebraska State Historical Society, disclosed the presence of at least 20 additional localities of archeological interest here and strongly indicated the advisability of more extended excavation. Findings by the field parties working here in 1947 have been briefly summarized in a previous report.

In early spring of 1948, a conference was arranged in Denver, Colo., in which representatives of the Bureau of Reclamation, the National Park Service, and the Missouri River Basin Survey participated. The Bureau of Reclamation generously offered to furnish power machinery and hand labor for the salvage of materials to be affected by reservoir construction, provided the River Basin Surveys would assume responsibility for the technical supervision of the work. The offer was promptly accepted, and the arrangements were embodied in a memorandum from the Regional Director, Region 7, Bureau of Reclamation, dated February 6, 1948. Under this arrangement, archeological excavations were carried on from March 29 until August

20, 1948. The Bureau of Reclamation made available the services of 15 to 20 laborers, a road patrol, and, for part of the time, a bulldozer, besides providing surveyors as their services were requested from time to time. From the Lincoln office of the River Basin Surveys, M. F. Kivett was detailed to supervise the operations and to insure that the work would be carried on in accord with recognized archeological procedures and standards. George Metcalf again was assigned as field assistant.

The Medicine Creek project has been outstandingly successful in every particular. Uniformly cordial and pleasant relationships existed at all times between River Basin Surveys personnel and the various representatives of the project, district, and regional offices of the Bureau of Reclamation. No better cooperation could have been asked than that extended by the latter agency in this matter.[2] The division of responsibility under which the work was conducted by the Federal agencies permitted the archeologists to devote their full time to the scientific and technical aspects of the operation. The applicability of power machinery under close and constant control to the excavation of village and camp sites, not previously attempted on a comparable scale in the Missouri Basin, was convincingly demonstrated.

Medicine Creek Dam, now well along in construction, is located 8½ miles north of Cambridge, Nebr., in the southeast corner of Frontier County. It is to be an earth-fill structure with a crest length of approximately 5,665 feet and a maximum height of about 115 feet above stream bed. Provision will be made for a maximum high-water level of 2,408.9 feet. At normal pool (elevation 2,366 feet), the reservoir will be 8½ miles long, with a shoreline of about 31 miles. It will control a drainage area of some 656 square miles. Purposes of the dam, a unit of the Frenchman-Cambridge project, are flood control and irrigation.

Between March 29 and August 20, comprehensive excavations were made in five sites, with more limited investigations in three others. With the mechanical aids available, entire sites were stripped of their sod and overlying soil cover, so that the complete village layout could be determined and mapped (pls. 1, 2). The actual clearing of house floors and storage pits, and the closer investigation of remains uncovered by the preliminary stripping, was done, of course, with hand tools. This technique, which made possible the accurate determination of native settlement patterns and the discovery of numerous small features not readily determinable by the usual hand-tool methods, is one of the great advantages of mechanized archeology. Remains uncovered include 28 prehistoric lodge sites, 75 storage pits, 22 refuse deposits, several burials, and more than 31,000 cataloged objects of pottery, stone, bone, shell, and other materials.

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[2] Special acknowledgment should be made of the helpfulness of C. L. Mutch, project engineer; H. E. Robinson, District Manager, McCook County; and A. A. Batson, regional director.

Work began on March 29 at site 25FT17, atop a high ridge (pl. 1) that will be incorporated into the west half of the dam structure. Here the major part of one site was excavated, including 8 subrectangular house floors (pl. 3 *a*, *b*), 21 storage pits beneath house floors, 4 outside storage pits, and 5 midden or refuse areas. From April 26 to May 5, the work was extended to 25FT16, a short distance to the west and close to the western terminus of the future dam. Here the Nebraska State Historical Society had previously excavated two house floors in 1947. A third lodge floor was cleared in 1948 by the River Basin Surveys, as were eight storage pits and three refuse areas. Practically all of these materials are assignable to the Upper Republican culture, although several pits and a few sherds suggest that an older Woodland occupation preceded the Upper Republican at 25FT17.

From May 6 until June 14, excavations were carried on at two Upper Republican sites located in the borrow area on the left (east) bank of Medicine Creek, a short distance above the dam site. At site 25FT13, 8 rectangular house floors were cleared and 17 storage pits were opened, 12 of them lying within the house units. Five refuse deposits, each lying near the entrance of one of the houses, were also excavated. Despite the stripping of large sections of the nearby village area, some of which had undergone considerable erosion, no other archeological features were noted. Extensive tests for burials on the bluff overlooking the village site from the east disclosed the remains of but a single extended adult male Indian; a few accompanying sherds, projectile points, and other objects suggest that this individual may have been an inhabitant of this or another nearby village.

Site 25FT14, a small Upper Republican village situated some 250 yards northwest of the preceding, was also worked partially during this period. A single house floor was cleared, and extensive test trenches were opened. Unfortunately, the larger part of the site had been destroyed by local collectors prior to the present salvage program.

On the right bank of Medicine Creek, approximately one-fourth mile above the dam site, was one of the larger village sites excavated in the reservoir area. This, 25FT70, lay only partially within the future pool area, and therefore was not completely cleared. Between June 15 and July 16, nine rectangular house floors were opened here (pl. 4, *a*, *b*); several of them were marked prior to excavation by slight elevations in the unbroken sod. Among the numerous specimens recovered from this site, particular interest attaches to the quantities of charred corn, mostly shelled, and the lesser amounts of beans, sunflower seeds, and squash seeds taken from storage pits. Several sizable sections of house timbers in an excellent state of preservation will be useful in determining something of the type of vegetation characteristic of the locality in aboriginal days and may also supply information toward an absolute dating for the site and for a part of the Upper Republican culture, which it mainly represents.

One small low-lying area within the limits of 25FT70 yielded calcite-tempered cord-roughened pottery, small pits, scattered post molds, and other artifacts perceptibly different from those in the surrounding Upper Republican houses. These, along with the burials of two children, are attributed to an earlier Woodland group.

At the edge of the bluff near 25FT70, stepped trenches were cut down the hillside to check the seeming occurrence of cultural debris in the lower portion of the terrace fill. These cuts, made in some instances to a depth of 6 feet, revealed evidence of extensive washing and scattering of cultural refuse from the bluff-top site. Below the surface refuse mantle and apparently in situ in the fill at the valley edge, were found scattered bones of a Pleistocene camel and of other unidentified animal forms. There was no evidence of anything that might be construed as Early Man. This area, worked between July 17 and 20, was designated Site 25FT29.

Several hundred yards upstream and also on the right bank of Medicine Creek, one subrectangular Upper Republican house site was opened at Site 25FT36. A second house floor lying above future pool level was located but not worked. Two midden areas slated for flooding were also worked out.

Site 25FT18, a Woodland site situated on a low terrace on the left bank of Lime Creek near its confluence with the Medicine, was completely excavated between August 3 and 20 (pl. 5, *b*; 6). Unlike the other and probably later village sites investigated, this one had no earth-lodge floors. Cultural materials and camp refuse occurred in a dark, stained layer varying in thickness from 6 to 30 inches and buried beneath 6 to 15 inches of lighter-colored wind-blown deposits. The entire cultural layer and all overlying sterile deposits, involving approximately 12,000 cubic feet of soil, were removed. Several fireplaces, numerous scattered post molds, and a few small pits or basinlike structures were cleared, all lying at the bottom and just below the dark culture-bearing stratum from which came most of the artifacts and specimens (pl. 6, *b*). The disarticulated remains of two adult burials were also recovered from the lower portion of the culture stratum. Artifacts from site 25FT18 include calcite-tempered cord-roughened potsherds, tubular bone beads, bone awls, small corner-notched projectile points, end scrapers, disk beads and rectangular to oval pendants of shell, and other materials.

The River Basin Surveys excavations at Medicine Creek in 1948 were concerned entirely with remains of pottery-making peoples, some of them, at least, depending partly on maize horticulture. Two cultural horizons appear to be represented—the Upper Republican and the Woodland. No clear-cut instances of stratification were found, and there is no direct evidence from the Medicine Creek Reservoir area itself as to the temporal relationships between these two complexes locally. From the broad similarity of the remains here to other culturally related materials found in stratigraphic relationship elsewhere, however, there seems no good reason to doubt that the Woodland remains represented sparingly at 25FT70, possibly at 25FT17, and more fully at 25FT18 were laid down some time before the more abundant Upper Republican remains. Kivett has tentatively designated the Woodland variant here represented as the Keith Focus.

Pending completion of the detailed analyses now under way on the 1948 Medicine Creek collections, only a few of the salient findings or trends of evidence can be noted here. Current views are that the Upper Republican in this locality probably flourished somewhere between the late thirteenth and late fifteenth centuries. As already indicated, there are timber specimens from some of the Upper Republican sites that may yield to dendrochronological analysis and from which the local complex may be datable in terms of the Christian calendar. Even if that hope fails, it should be possible to determine the relative building dates of individual houses within a single village unit, or between groups of houses in different parts of the several villages. There are already evident rather definite variations in detail in sherd types from the various sites, as well as in sherd samples from different house units of the same village. These variations seem to correlate with other minor but consistent differences in the material culture inventory, and possibly are due to something more than mere family or individual tastes.

The present excavations have confirmed and greatly amplified earlier views regarding the nature of the prehistoric Upper Republican occupancy. Subsistence was basically by corn-bean-squash-sunflower horticulture, with the bison scapula hoe as the characteristic gardening tool. Quantities of mammal and bird bones indicate that hunting was also important, the nearby bison having been heavily drawn upon. Bone fishhooks and, in some sites, great quantities of freshwater-mussel shells, indicate other sources of food. Underground storage pits were a regular adjunct of the dwelling complex, occurring inside as well as outside the houses. They are both smaller and less numerous in relation to the number of house units than the storage pits of the later Pawnee and other historic horticultural village tribes of the eastern plains, which suggests to me a somewhat less intensive or less productive food-raising complex. The loose, scattered nature of the villages, characterized by rectangular earth-covered dwellings arranged in groups of two to four or more units and separated by a few rods from another similar cluster, all of them unfortified (pl. 1), is in striking contrast to the great, compact, often ditched and palisaded, earth-lodge villages seen among the Pawnee and their neighbors in eastern Nebraska during the sixteenth, seventeenth, and eighteenth centuries.

Judged by the findings at 25FT18 and 25FT70, the Woodland occupancy of the locality was appreciably different from the Upper Republican. No evidence of domestic crops came to light, and the bone hoe was absent, as it has been so far at other Woodland sites excavated or tested in the Nebraska-Kansas region. The bones of birds and animals were moderately abundant throughout the culture strata involved. There is some indication that deer and smaller animals were hunted to a much greater extent than the bison, which, in later prehistoric and historic times, apparently became the principal meat source. Pottery was present in much smaller amounts than in the Upper Republican horizon, and the number of vessels owned per family was certainly very considerably lower. Small, well-made, stemmed projectile points suggest use of bow and arrow. There was no recognizable evidence of fishing. In contrast to the substantial earth lodges of later times, small structures of perishable materials seem to have been used for habitation. These, presumably, were erected in or over some of the small basinlike features revealed in the excavations, and around or near the ash-filled fireplace depressions. Unfortunately, no post-mold configurations recognizable as possible house patterns could be worked out.

One of the few disappointments of the season at Medicine Creek was in the fact that no Upper Republican burial grounds could be located and worked out. The single extended skeleton on the hill east of 25FT13 is very likely from the Upper Republican period, but of course is inadequate to show convincingly the physical type and somatological relationships of the natives who left the great majority of village sites so far located in and about the future reservoir area. Unless interment was in single isolated or remote graves, or was not a regular method for disposing of the dead among these villagers, it may be presumed that among the still-unfound antiquities of the locality there must be a number of burial grounds.

For the Woodland horizon, the available evidence is not much more satisfactory. The two burials at 25FT70 were those of children, and there is but a single measurable skull from the grave at 25FT18. Since these sites seem to have been generally rather small, associated burial grounds of any size are perhaps not to be expected. One is tempted to wonder, incidentally, whether the placing of a grave, with single or compound burial, in the camp area by the Woodland peoples may have been a factor in their abandonment of the sites.

Concerning the external relationships of these early Medicine Creek peoples and their contacts with contemporary groups, little information came to light. At none of the sites worked was there any recognizable evidence of puebloan pottery or other Southwestern trade materials. Absent, too, were obsidian, steatite, and other exotic minerals from the regions to the west, as well as finished products or raw materials certainly attributable to peoples of other culture to the southeast or east. The general impression is thus one of closely self-centered small communities too busy with their own local affairs to engage extensively in long-distance trading or other ventures.

As has been noted, where the sites examined this summer lay in unbroken ground or had not been subjected to long-continued and deep erosion, they were overlain by varying depths of light wind-blown soil. This overlying mantle, capped with sod, generally obscured the village horizon, so that potsherds, chipped stone and rejectage, and refuse animal bone could be detected only along the eroded margins. With removal of the overburden, the old occupational level showed up as a dark-stained zone varying in thickness and in the amount of cultural admixture. The house sites had been dug to varying depths into this old village level; some houses had been but slightly below the contemporary surface, others had been in pits up to 15 or 18 inches deep. The implication would seem to be that at the time the Upper Republican peoples inhabited the locality, the terrace and bluff surfaces were at a somewhat lower level and that moisture was adequate to maintain a relatively stable vegetation cover. Subsequent to abandonment of the village sites, there has been increased soil movement, with no indication that a stable humus level was again reached until the present sod developed and a new soil-forming period set in.

This apparent correlation of prehistoric corn-growing peoples with former soil surfaces now buried by aeolian deposits has been noted at other places in the Republican drainage and elsewhere in the Nebraska-Kansas region. Some of the sites at Medicine Creek have been inspected very briefly by soils experts, but more detailed studies will be necessary before the true significance of this seeming correlation can be set forth. The prospects seem excellent, however, for eventual dating, through the associated archeological materials, of some of the climatic fluctuations that have characterized the region for many centuries past, but within the time of men who attempted to make their living through the cultivation of maize and other crops.

NORTH DAKOTA

The only archeological field work programmed for North Dakota by the River Basin Surveys during 1948 was limited excavation at the Heart Butte Reservoir site. Previous investigations here include a brief reconnaissance by Paul L. Cooper and J. J. Bauxar on August 15 and 16, 1946, at which time a small part of the proposed reservoir was examined and local residents were consulted. During the 1947 season, a party from the University of North Dakota and the North Dakota Historical Society, under leadership of Dr. Gordon W. Hewes, spent approximately 1 week in the locality. The 1948 operations here by the River Basin Surveys were designed to make a final test of the archeological possibilities of the locality. The party was in charge of Paul L. Cooper. From June 12 to June 20, he was assisted by Thad C. Hecker, of the North Dakota Historical Society, and the work consisted mainly of further survey, chiefly on the south side of the river. From June 21 to August 1, the party consisted of Cooper and two student helpers, Warren Wittry and Robert Hall. One local laborer was employed from July 6 to July 30.

Heart Butte Reservoir site.—Heart Butte Dam is under construction on Heart River, in northern Grant County approximately 15 miles south of Glen Ullin. It is an earth-fill structure, with a height of 123 feet and a crest length of 1,850 feet. At full pool (elevation 2,084.5 feet), the reservoir will be about 14 miles long, with a maximum width nowhere much exceeding 1 mile. The Heart here follows a general easterly course through a steep-walled, flat-floored valley lined with well-developed terraces. Timber is sparse, consisting of some juniper on the slopes and deciduous trees—mostly cottonwood, ash, and chokecherry—on the bottoms. Most of the ground, except where under cultivation, is heavily grassed.

Following a check of previously unvisited portions of the area, most of the activity between June 21 and August 1, 1948, consisted of excavation at site 32GT1, a pottery-bearing site (pl. 12, *c*) on the north bank of the Heart River about 3 miles above the dam site. The excavations totaled some 380 feet of trenches cut into undisturbed portions of the site. Cultural materials were found chieflly at depths varying from 6 to 24 inches beneath the present surface. There were large quantities of bison bone, most of it badly split and broken; bones of the domestic dog also occurred. Artifacts were not plentiful. Pottery showed simple stamping, with cord-impressed designs, and appeared to be related to late Mandan or Hidatsa wares. House remains or other structures were not observed, but small fireplaces occurred in some numbers. These were simple affairs—small burned areas, sometimes basin-shaped, and capped by ashes.

During the last week in the area, tests were made at a rock shelter, 32GT5. This produced some evidences of late, brief, and casual occupancy; tests on the slope below were mostly negative. Other sites examined include two bison kills or hunting camps, five small sites yielding scattered bits of pottery and other debris, and two small flint-littered areas that may have been workshops.

On the basis of the several examinations made between 1946 and 1948, it may be concluded that the known antiquities threatened with destruction by Heart Butte Dam are not likely to constitute a serious loss to archeology. Temporary hunting camps, some of them probably belonging to the village tribes resident on the Missouri 50 or 60 miles to the east, seem to be the chief remains. The bison kill, 32GT6, on the north bank of the river some 4 miles above the dam site, may be of some antiquity and would possibly repay partial excavation. The considerable overburden would make this a costly and difficult task, however, and it seems not improbable that the information to be derived therefrom could be duplicated from other similar sites lying outside of areas that will be affected by reservoir construction. Unless remains not now known are turned up in course of construction, Heart Butte Reservoir site can probably be written off as no great loss to archeology or paleontology.

SOUTH DAKOTA

Archeological investigations by the River Basin Surveys were carried on at three Federal water-control projects in South Dakota during 1948. One party under Jack T. Hughes, with J. M. Shippee as field assistant, and with local labor from time to time, was in the Angostura Reservoir near Hot Springs, S. Dak., from June 2 until September 15. On September 27, Hughes and Shippee made a brief reconnaissance of Pactola and Johnson Siding Reservoir sites, on Rapid Creek a few miles west of Rapid City, locating one small site at the latter locality. Another party, led by Paul L. Cooper and including Robert Hall, Warren Wittry, and, during the month of August, Gordon F. McKenzie and Miss Dorothy E. Fraser, worked from August 1 until September 10 along both banks of the Missouri between Pierre and the Cheyenne River. This section, with an abundance of native village sites, will be flooded by the proposed Oahe Dam to be built a few miles upstream from Pierre. During the last 2 weeks in November, Cooper and Shippee excavated a burial mound situated on the spillway line of Fort Randall Dam, now under construction a few miles north of the Nebraska-South Dakota line. Excepting this latter work, which was done in conjunction with the Corps of Engineers, most of the South Dakota field operations consisted of survey and test excavations.

Angostura Reservoir site.—Angostura Dam is now under construction (pl. 7, *a*) on the Cheyenne River, in Fall River County about 9 miles south of Hot Springs. Here a concrete dam and earth-fill dikes rising some 130 feet above stream bed and having a crest length of about 1,775 feet, will impound a pool 11 miles long by 1½ miles wide. At maximum pool (elevation 3,200 feet) an area of about 4,995 acres will be under water; at minimum pool (elevation 3,162.5 feet) the pool area will be about 2,690 acres. Purpose of the project is irrigation.

The future reservoir will lie in a narrow sheltered belt curving around the south and east flank of the Black Hills. To the west and north, the terrain is hilly and rough, with coniferous forests on the higher portions. To the east and south are gently rolling grass-covered hills and plains. Within the reservoir area, the Cheyenne has only two tributaries of note. Sheps Canyon enters from the left a few hundred yards above the dam site; it contains springs but the channel is badly clogged. Less than 3 miles above the dam, Horsehead Creek joins the Cheyenne from the right; it has a valley with broad bottoms, well-developed terraces, and an intermittent flow of water. Most of the reservoir area is a wide valley, with a strongly developed series of terraces along the river. Cottonwood formerly stood along the stream banks, with stands of yellow pine in the ridges; the greater part was grass-covered.

Including the findings during a brief reconnaissance in 1946, a total of 71 archeological sites is now on record for the locality in and near Angostura Reservoir. The great majority of these are sites that will be destroyed by the construction of the reservoir and associated works. None show evidence of any single long-time occupancy; frequent and repeated use of the locality by various peoples over a long period of time seems rather to be indicated.

Three sites from which small sherd samples were collected suggest relationships on at least two time levels with pottery-making cultures to the east. One of these sites, lying on Horsehead Creek, shows cord-roughened ware with simple unthickened vessel lips bearing diagonal impressions. These sherds were found in thin, shallow, layered refuse deposits, along with quantities of broken bison and other large bones. A hunting camp may be indicated, possibly one used periodically by small groups of Indians residing normally farther to the east or south. Some relationships may be suspected with a late prehistoric pottery-making group, such as the Upper Republican peoples of the Loup-Platte-Republican region.

At two other sites pottery of a different sort was found. This ware was thin and well made; the surfaces commonly bore simple stamping or, in several instances, incised decoration. It is reminiscent of pottery previously found at sites in Ericson, Mullen, and Harlan County Reservoir areas in Nebraska, in northeastern Nebraska, and on Sundance Creek in Crook County, Wyo. It is associated at Angostura with small triangular arrow points, planoconvex scrapers, chipped knives, etc.; no habitation sites have yet been identified, although there is some tendency for the material to occur in spots suggesting midden or former lodge sites. No white trade goods were found in association, though the horizon represented is generally supposed to be very late prehistoric or protohistoric.

Among the far more numerous nonpottery sites, there seem to be several variant complexes. Owing to the extremely limited excavations to date, however, they cannot as yet be satisfactorily defined. They include numerous camp sites situated on the ridges, terraces, and bluffs along the river. Some are covered by a few inches to several feet of wind-blown sand or fluviatile silts. Chipped stone, flakes, rejectage, bone fragments, and similar refuse occurs in varying amounts. Some sites have rock-bordered fireplaces; at others there are rock-lined fire basins (pl. 8, *a*); still others show rock-filled pits. In a number of instances, grinding implements have been found about these hearths. Projectile points, like the hearths and some other remains, show appreciable variation from site to site, and may have real diagnostic value for the establishment of cultural units.

Tipi rings were recorded at only five locations within the reservoir area, but are said to be very common elsewhere in the locality. As elsewhere, so here there were few artifacts in association. At one site (39FA13), a tipi ring directly overlay a stone-filled hearth from which it was separated vertically by several inches of soils (pl. 9, *a*). It is believed that most of these rings are probably among the more recent remains of the region.

Of more than passing interest are several sites in the lower part of the reservoir area where roasting pits occur (pl. 8, *b*). These are about 2½ feet in diameter by 3 feet deep, narrowing somewhat in the upper portions. Charcoal and fire-cracked stones occur in the bottom, above which is dark, sooty soil. The pit walls are usually hardened and fire-reddened. Thin layers of clean sand in the lower part of the fill suggest periodic reuse. Associated with these pits are small side-notched points, planoconvex scrapers, mealing slabs and handstones, and other items. In one or two instances, the pits are locally reported to have been used for burial purposes, with bone awls, large and small tubular bone beads, and other objects accompanying the dead. No pottery was found on these sites, although in southern Nebraska and western Kansas somewhat similar pits occur in sites of the pottery-using semihorticultural Dismal River peoples (Plains Apache) of the late seventeenth and early eighteenth centuries.

Noteworthy, too, is a camp site (39FA65) lying some 3 miles up Horsehead Creek, on its right bank. This site, portions of which will certainly be inundated by the reservoir pool, lies at the edge of a small "badlands" area (pl. 10, *a*). From the eroded margin of the site came a large Plainview type projectile point and several basal fragments of lanceolate points with narrowed straight to concave bases, fine flaking, and ground proximal edges. Lanceolate point fragments were also recovered in excavations (pl. 10, *b*), which further disclosed small circular fireplaces without stones, and considerable amounts of minute, paper-thin flakes from the manufacture of chipped artifacts. Strangely enough, in the work done here to date, virtually no animal bones were encountered. Other artifacts include chalcedony plate knives, medium to large bifacial blades, end and side scrapers, a gougelike fragment somewhat reminiscent of the Clear Fork, Tex., gouges, and a subrectangular mano. Some of the blades suggest affinities with the finely made implements recovered by Roberts at the Agate Basin bison kill in Wyoming a few miles to the west, and with specimens found by the University of Nebraska State Museum on Hat Creek and White River, in Nebraska, a few miles to the south. It is believed that the site may have considerable antiquity, at any rate as compared with most of the others recorded in the district, but much more work and more intensive geological studies will be needed.

Much of the chipped stone and rejectage found at sites in Angostura evidently was gathered by the natives at aboriginal quarries in the region. None of these occurs within the future pool area, but one of the largest lies about 6 miles airline northwest of the head of the future reservoir. Shown on the United States Geological Survey's Edgemont quadrangle sheet as "Flint Hill," this is at or near the head of Hell Canyon. Scores of large craterlike pits and piles of rough workshop debris (pl. 9, *b*) litter nearly a half section of high tableland. Gray, purple, brown, red, and yellow quartzite were obtained here from the Cretaceous Dakota formation. Numerous artifacts in great variety of size and form have been collected in and about these pits during many years by their owner, Mr. Neal Conboy, who generously showed members of the Survey party over the ancient diggings. On lower benches and slopes nearby are to be seen many tipi rings; others to the number of many hundreds are said to be scattered for some miles northward from the quarries. Additional aboriginal diggings occur in the area, notably at Battle Mountain near Hot Springs. The general appearance of those observed was very similar to the better-known and more extensive Spanish Diggings some 70 miles to the southwest in Wyoming.

Within historic times—that is, after about the first quarter of the nineteenth century—the Black Hills were dominated by the Teton Dakota. Before that, during the latter eighteenth and early nineteenth centuries, they were part of the Cheyenne range, with such other tribes as the Kiowa, Comanche, and Arapaho also utilizing the game, fuel, and other resources of the region. It is possible that at a still earlier period Shoshoneans from the Wyoming basin occasionally wandered into the district. There is neither documentary nor archeological evidence that corn-growing peoples ever established themselves here in any strength or over any long period, although it is possible that some planting of a perfunctory sort may have been practiced occasionally, as by the Cheyenne, even as late as the nineteenth century. What is evident, however, from the still incomplete archeological record is that throughout a long period of time, migratory nomads seasonally or otherwise availed themselves of the natural advantages the region offered over the barren, sun-baked, and windswept surrounding plains. Moreover, since pottery-making peoples from the east and south evidently did venture into the locality from time to time, the prospects seem good for injecting time perspective into the local archeological picture. Additional study is needed to determine the cultural allocation of the pottery horizons represented here, and these will have to be fitted stratigraphically or otherwise into their proper position in the apparent succession of nonpottery horizons from the west.

Angostura is one of several reservoirs proposed for the upper Cheyenne River Basin and the Black Hills region. Lying between the area of semihorticultural, pottery-making peoples to the east, and the nonpottery-making hunters and gatherers to the west, it offers an unusual opportunity to study the interrelationships and to work out the chronological relationships of representatives of these two widely divergent subsistence economies. In the midst of an otherwise dry uninviting region, the Black Hills offer, within a comparatively limited geographical area, the advantages of mountain, valley, and plains environments. Here could be found water, wood, shelter, useful minerals, an abundance of large and small game, and a rather surprising variety of native flora. Small wonder that the historic hunters, as their predecessors long before, returned season after season to the Hills.

Fort Randall Reservoir site.—Archeological work at Fort Randall Reservoir site, a Corps of Engineers project on the Missouri just above the Nebraska line, consisted of the excavation of a burial mound lying on the left bank just below the dam site. This mound, 39CH9, lay in the path of construction activities for the spillway, and so was slated for complete removal. Through the cooperation of the Omaha district engineer and the area engineer at Pickstown, S. Dak., the construction agency provided a bulldozer, and the River Basin Surveys furnished a limited amount of hand labor and the technical supervision. Mr. John Trantina, geologist for the engineers at Pickstown, kindly surveyed the mound before its removal. Paul Cooper was in charge of the excavation, and was assisted by J. M. Shippee. This work was carried on between November 9 and 24.

The mound lay at the edge of the bluffs some 200 feet above the Missouri River bottoms, its summit marked by the Corps of Engineers monument L–15 (elevation 1,454 feet). Before excavation, it rose to a height of about 4 feet, with a diameter of approximately 60 feet. Its surface was cut up by various small excavations, wherein occasional bits of bone could be seen. Otherwise, the only remains of aboriginal activity in the immediate vicinity were a few flint chips from the surface of a cultivated field lying nearby to the north.

Upon excavation, it was found that the mound covered a subrectangular pit, with which timbers had been associated. There were no burials in this pit. Several secondary burials occurred in the mound fill and at its base. These included at one point a sort of platform of long bones laid side by side, on top of which were placed four skulls (pl. 11, *a*). It is presumed that all the interments had been secondary, although two were apparently partially articulated. No certain association could be determined between any of the burials and the artifacts, several of which came from the mound fill and out of animal burrows.

Artifacts included two small vertically elongate pottery vessels, with subconical base; both were apparently grit-tempered, and one bears a fabric marking on the surface. There were also two chipped projectile points, one large and corner-notched, the other small with side notches. Fragments of washerlike shell objects, and a few disk and tubular shell beads came to light. There were also numerous perforated canine teeth, the holes through the roots distinguished by cutting rather than by drilling, and with mesial and lateral surfaces flattened.

There are several specific trait similarities between this material and that obtained in 1947 from burial mounds (39CH4) on Wheeler Bottom some 13 miles upstream. At neither of these sites, however, does the burial complex as a whole correspond to any other now known burial mound of the Dakota region. The associated village complex, too, remains at present unknown. Studies now under way on the cultural and skeletal materials may throw further light on the prehistoric mound builders whose vestiges occur but sparingly west to the upper Missouri Valley.

Oahe Reservoir site.—The Oahe Reservoir is one of five major water-control projects planned by the Corps of Engineers for the Missouri River in South and North Dakota. The proposed dam site (pl. 12, *a*) is in Hughes and Stanley Counties, South Dakota, about 6 miles northwest of Pierre, S. Dak., and 1,123 miles above the mouth of the Missouri. Here, across the lower half of Wood Island, will be erected an earth-fill structure, with a maximum height of 242 feet, and a crest length of 9,800 feet. At full pool (elevation 1,620 feet), an area of some 298,000 acres will be flooded, and the waters will back up the Missouri to the vicinity of Bismarck, N. Dak. Purposes of the project, on which actual construction has not yet begun, are given as flood and silt control, power, irrigation, and navigation.

In the portion of the Missouri Valley that will be flooded by Oahe Reservoir, the river winds through a flat-floored, alluvium-filled trench from 1 to 4 miles wide, bordered by bluffs from 200 to 400 feet high. Above the flood plains, which are often as much as 1 or 2 miles wide, benchlike terrace remnants rise at various elevations from 20 to 100 feet or more. Frequently, the river swings against the base of the bluffs on one side, leaving on the opposite bank a broad terrace or "bottom" with a gentle ascent to the bordering uplands. Thus, as a result of the meandering habit of the stream, the banks are characteristically a series of bottoms or flats alternating with rugged, hilly sections. The larger tributaries, all entering from the west and including from south to north, the Cheyenne, Moreau, Grand, and Cannonball, have all cut their valleys 100 to 400 feet below the uplands, have well-developed flood plains a mile or more wide, and are bordered by well-defined terraces of varying age. Groves of deciduous trees, including especially cottonwood, ash, elm, and oak, stud the valley bottoms and line the stream banks, often growing also in the narrow ravines that descend from the bluffs.

Remains of aboriginal village sites are extraordinarily plentiful on this section of the Missouri. They include some of the largest, best preserved, and most impressive sites in the Missouri watershed and Great Plains region. In historic times, after *circa* 1800, various bands of the Dakota Sioux ranged across this territory, but without establishing any fixed towns. Along the main stem, the South Dakota section of the future reservoir was the habitat of the village-dwelling Caddoan-speaking Arikara, who dwelt at various times in a series of fortified and unfortified towns from approximately Pierre northward. Farther upstream, above the Grand, were the towns of the Mandan, historically in the vicinity of the Heart River and above, but previously probably located in part farther downstream. Earlier settlements of this people possibly underlie some of the Arikara townsites below the Grand. The Cheyenne on their historic (late eighteenth century) movement westward from the Red River drainage to the Black Hills, are thought to have tarried for a time on the Missouri. It is quite likely, too, that still other semisedentary groups, of whom there is little or no known record at present, at one time made this region their home.

In contrast to the valley below Pierre and above Knife River, a considerable amount of archeological work has been carried on at various localities in the future Oahe Reservoir area. Before the war, surveys were conducted from time to time by the University of South Dakota Museum in South Dakota, by the North Dakota Historical Society in North Dakota, and by Logan Museum of Beloit College in both States (1929–31). In 1932, the Bureau of American Ethnology worked in the vicinity of Mobridge, S. Dak.; in 1938, Columbia University and the North Dakota Historical Society operated a joint expedition in the vicinity of Bismarck; and in 1939, a Columbia University-University of South Dakota-WPA expedition excavated in a number of sites between Pierre and the Cheyenne River. In 1947, a joint expedition representing the University of North Dakota and the North Dakota Historical Society excavated a prehistoric site below Fort Yates, N. Dak. So far, only summary reports, fortunately of high quality, are available on these latter operations. Several reports on the archeology of the Missouri in North Dakota have also appeared, but the reconstructions of prehistory so far published for the main stem below the Heart River rest largely on survey work rather than on the badly needed excavations that alone will give the larger picture. Thus, despite the apparently extensive nature of work to date in this general locality, by comparison with what remains to be done in the way of detailed examination of key sites, only a beginning has been made.

In the 6 weeks allotted to reconnaissance in the future Oahe Reservoir, it was manifestly impossible to cover the entire area. Priority was given, therefore, to that section lying between the proposed dam site near Pierre and the mouth of Cheyenne River some 40 miles upstream. Coverage included mainly the west bank, with some reconnaissance at several sites reported along the east bank; not all parts of the entire section were walked out. Some test trenching was carried out in the vicinity of Fort Bennett. Prior to the River Basin Surveys work, a list of some 30 sites known for this locality had been provided by the South Dakota Archeological Commission. Most of these were revisited by the 1948 Surveys party. Additional sites were also located, so that there is now on record a total of 46 recorded sites on the west bank of the Missouri between Fort Pierre and the Cheyenne River and about 15 sites on the east bank.

Of the 61 sites visited by, or reported to, the 1948 Surveys party, the majority appear to be remains of earth-lodge villages. Fortifications consisting of ditches (pl. 12, *b*), low ridges of earth, and occasionally including traces of bastions, were noted at a number of sites. Hut rings, circular or oblong depressions, storage pits, refuse deposits, and other features characterize many of these sites, particularly where the surface has not been broken by cultivation. In size, they range from small communities of perhaps a dozen or less houses to great settlements like the Fort Sully site, where hundreds of house pits and quantities of refuse cover an area nearly a half mile long by 200 yards wide. At some, there is evidence of occupation by Indians into the time of the White conquest; but it is a safe guess that many were inhabited at an earlier period.

As Strong observed in 1936, ". . . the Upper Missouri area is exceeded in the size and number of sites as well as in cultural importance only by the pueblo region of the southwest, the lower Mississippi area, and the mound region centering in Ohio. . . . Yet this highly important archeological area is at present represented by a single major monograph and that only partially based on actual excavation." In terms of our present salvage problem, it may be noted further that the extent of probable flooding of archeological sites in this region is not generally appreciated. With a dam 200 feet or more high just above Pierre, most of the terrace sites, at least as far upstream as Fort Yates, N. Dak., will be under water at full pool. Among the better known sites that face destruction will be: Buffalo Pasture (39ST6), on a 70-foot bench just above the upstream toe of Oahe Dam (pl. 12, *b*); Lower Cheyenne Village (39ST1) on a 60-foot bench at the mouth of Cheyenne River; Fort Sully village site (39 SL4), on Telegraph Flat 150 feet above the present river; and the Rygh (39CA4) and Leavenworth (39CO9) sites on opposite banks some 13 miles north of Mobridge, S. Dak. Even those sites not under water the year around will be subject to slumping and eventual slippage into the reservoir when the Pierre shale which underlies many of them becomes waterlogged. This is already taking place at the Lower Cheyenne Village site, much of which has been destroyed in the last half century by slumping; and it is quite likely that additional sites will be similarly affected.

Of immediate concern is the area surrounding the proposed dam site. Here no less than four archeological sites face destruction when dam building gets under way. Two of these, 39ST15 and 39ST16, lie on and beside the access railroad and classification yard, approximately 2 miles below the dam site on the right bank. A third, 39ST14 (Scotty Phillips Ranch site), lies about half a mile below the downstream toe of the proposed dam, in the work area. It is also situated on the right bank, and is a fortified site measuring approximately 175 by 275 yards, with perhaps 18 or 20 house pits within the enclosure. It has apparently never been excavated or tested, but offers an exceptionally good opportunity for extensive and relatively inexpensive excavation by the controlled use of power machinery and hand labor. Across the river, directly in line with the proposed intake structure and lying beneath the dam fill, is a small cluster of house pits, designated 39HU22. The fourth site lies approximately 1,100 yards above the upstream toe of the proposed dam, on the right bank of the stream and well within the future pool area. This is the fortified Buffalo Pasture site, 39ST6, where limited excavations have been made within the ditched portion. Excepting this latter, all of the sites here noted will undoubtedly be destroyed or very extensively damaged as soon as construction begins. It is imperative, therefore, that systematic sampling be done at the earliest possible moment at all of the sites, and that at least one, preferably 39ST14, be comprehensively investigated.

Because of the great size of this reservoir, it seems certain that many hundreds of sites will be forever obliterated when it fills. That similar remains can be found outside the area to be flooded is improbable. It is particularly important, therefore, that salvage operations here be pushed as rapidly as possible. Further reconnaissance in the as yet unsurveyed remainder of the pool area should be completed as promptly as possible, so that key sites can be chosen. Excavation is a time-consuming task at best; and if the initiation of a program of systematic excavation be too long deferred after dam construction begins, archeologists will be confronted at the last moment with an impossibly huge piece of work.

WYOMING

Archeological field work in Wyoming during 1948 was limited to preliminary reconnaissance at two proposed Bureau of Reclamation projects in the northeastern part of the State. These were: Edgemont Reservoir site, in Weston County, and Keyhole Reservoir site, in Crook County. The field work was done by J. T. Hughes and J. M. Shippee from September 16 to 20 at Edgemont, and from September 21 to 25 at Keyhole. Both localities are in the headwater drainage of the Cheyenne River, on the flanks of the Black Hills uplift.

Edgemont Reservoir site.—The locale involved here lies on Beaver Creek, a tributary of the Cheyenne, some 35 miles northwest of Angostura and about 18 miles south of Newcastle, Wyo. The Beaver is a small meandering stream in a barren plains country. Its valley is lined with numerous terrace remnants and abandoned channels. The Black Hills are a few miles to the northeast. No figures on dam specifications are at hand, but the pool area is to be approximately 5 miles long by 1 mile in maximum width. Purpose of the project is irrigation, and flood and silt control.

The 4-day reconnaissance of the proposed pool area disclosed a total of 28 sites. These occur almost continuously on and in the terraces along both banks of the stream. Generally they are fairly superficial, but overburden in some cases ranges up to several feet in depth. Commonly the sites are marked by clusters of fire-cracked stones and quantities of flakes. Hearths of surface, basin, and pit types are apparently represented, and there appears to be a considerable variety in stone artifact types. At one place, a cut bank shows near the surface a roasting pit, which is underlain at successive lower levels by basinlike fireplaces. Here, and elsewhere in the locality, there would seem to be good prospects for correlating a succession of human occupations with a sequence of geological events reflected in the formation of minor stream terraces.

No pottery-bearing sites were recorded during the present survey, although farmers living upstream from the proposed reservoir area report the occasional finding of pottery vessels along the Beaver. Most of the sites seen were littered with greater or lesser quantities of chipped stone and rejectage, projectile points, blades, scrapers, knives, blanks, chert cores, etc. A few sites yielded manos. Obsidian flakes were found at Site 48WE29. That a long range in time is probably involved may be inferred from the fact that specimens recovered range from stone points of early types to glass trade beads of the historic period.

Keyhole Reservoir site.—The Keyhole Reservoir site is on the upper Belle Fourche River, at the west edge of the Black Hills some 65 miles northwest of the Edgemont Reservoir site. A dam 105 feet high and, with dike, about 1,100 feet long, will be located some 11 miles airline northeast of Moorcroft, Wyo. At full pool, the reservoir will be about 10 miles long and will have a maximum width of 6 miles. The reservoir is intended for flood and silt control, and for storage of irrigation waters for the Belle Fourche project in western South Dakota.

In the western or upper part of the reservoir site, relief is comparatively low. The river meanders through a wide, shallow valley, treeless except along the immediate banks of the watercourses and flanked by rolling short-grass upland prairies. The eastern portions, on the other hand, have rather abrupt valley edges and some canyon topography, and are surrounded by pine-covered hills. Vegetation characteristically varies from sagebrush and short grass in the west to a fairly heavy yellow pine cover on the east.

In the 5 days available for reconnaissance here, it was not possible to search the entire pool area, but a check of the most likely portions disclosed 29 sites of archeological interest. A thorough reconnaissance would probably reveal many more. With two or three exceptions, all of those found will be largely or entirely destroyed when the reservoir fills.

Judged by the results of the reconnaissance, sites seem to be especially plentiful in the lower portions of the future pool area, around the confluence of Deer, Mule, and Cottonwood Creeks with the Belle Fourche. They are situated in a variety of topographic positions. Rock hearths seem to be rather less plentiful than at Edgemont or Angostura. No pottery-bearing sites or evidence of white trade contacts were seen. A number of the occupational areas are of some size and quite productive; where protected as they are in some instances by overburden, they should well repay excavation. Camp-site debris consists of chipped stone, a few projectile points, blades, scraping and cutting tools, and abundant flakes and spalls. Fragments of bone and shell occur at some sites, and some obsidian was found. Noteworthy is the fact that a number of heavy lanceolate, "fish-tailed," and notched projectile point forms were recovered, closely resembling forms which have been found elsewhere under conditions suggesting considerable antiquity. There is thus a likelihood that hunting horizons earlier than most of those represented at other reservoir sites around the Black Hills here await further exploration.

In the opinion of the archeologist making this reconnaissance, Keyhole offers more promise than does Edgemont and would probably prove relatively as productive and important as Angostura.

FIELD WORK IN PALEONTOLOGY

Paleontological field investigations in the Missouri River watershed were carried on by the River Basin Surveys from June to October, 1948. Three reservoir sites, all of which had been partially investigated during 1947, were revisited in further search for vertebrate fossils. No new reservoir localities were examined. The work was under the supervision of Dr. T. E. White, who was assisted throughout much of the season by two student helpers—Ernest L. Lundelius, University of Texas, and John C. Donohoe, Montana State College. From August 2 to 5, White and Lundelius participated in a field conference of the Society for Vertebrate Paleontology and in a tour of certain paleontological localities in Wyoming, under sponsorship of the University of Wyoming. During the latter part of August, they spent approximately 2 weeks making physiographic studies on Horsehead Creek, in Angostura Reservoir, South Dakota, in connection with the archeological investigations at Site 39FA65, as elsewhere described in this report.

From June 4 to July 12, Dr. White's party operated in the Boysen Reservoir area on Big Horn River north of Shoshoni, Fremont County, Wyo. This work was materially expedited through information supplied by Mr. Harry A. Tourtelot, of the United States Geological Survey. Although fossil material was fragmentary and scarce, a sufficient variety of specimens was collected to establish definitely the age of geologic formations heretofore only tentatively correlated.

From 6 localities, most of them on the lower course of Cottonwood Creek, in the Lost Cabin faunal zone of the Lower Eocene, remains of 23 species of fossil mammals were collected. These were mainly of small forms; they include insectivores, primates, rodents, carnivores, condylarths, perissodactyls, and artiodactyls. One of the insectivores represented is a species new to science. Also included in the material is the most nearly complete skull yet found of the primitive insectivore, *Didelphodus*, and the skull and jaws of a small carnivore, *Didymictus*, previously represented only by upper and lower dentitions. These and other specimens promise to contribute important information to knowledge of the morphology of Eocene mammals. Reptilian remains collected will clarify a number of details concerning the cranial morphology of one genus. A technical report on the paleontological findings in this area is being prepared for publication.

From July 14 to August 19, work was carried on in the Oligocene and Miocene deposits of Canyon Ferry Reservoir site, on the Missouri River north of Townsend, Broadwater County, Mont. Here the party was aided through information supplied by J. Leroy Kay of the Carnegie Museum, Pittsburgh, Pa. Nearly 125 specimens representing 14 genera were obtained from 3 localities in the Oligocene and 2 localities in the Miocene. The remains of rodents, insectivores, and small artiodactyls were most abundant. The small Oligocene mammals of this montane area, when compared to those of the same age on the plains, interestingly illustrate the principles of geographical variation as well as do the living species.

The period from August 21 to September 3 was spent in Angostura Reservoir, on the Cheyenne River south of Hot Springs, S. Dak., assisting with geological studies the archeological work being carried on by Hughes for the River Basin Surveys at site 39FA65. Borings were made with a hand auger to determine the depth and character of the valley fill on Horsehead Creek in the immediate vicinity of the site, and geologic profiles were compiled. On the basis of these preliminary studies, it appears that the physiographic history of Horsehead Creek will have to be worked out in conjunction with that of the Cheyenne River, and that the key to a geological dating of the terrace in which 39FA65 is situated probably lies in correlation of the terrace with the receding falls of the Cheyenne. The falls now lie a short distance above the canyon in which the dam is located, but in the canyon the maximum height of the waterfall member corresponds to the height of the oldest terrace on Horsehead Creek, in which site 39FA65 is located. It seems possible, therefore, that the gorge of the Cheyenne at the dam site was cut, for the most part, after the occupation of site 39FA65. A report has been prepared on these preliminary findings for inclusion with a detailed report on the archeology of the site; and it is hoped that additional observations will be possible before the archeological and geological features involved are covered by the reservoir waters.

Following completion of the physiographic studies at Angostura and drafting of a report on them, Dr. White again went into the field. From September 23 to October 1, the Upper Cretaceous Carlile Shale in the Cedar Bluff Reservoir site on the Smoky Hill River southeast of Wakeeney, Trego County, Kans., was prospected for fossils. A number of fossil fish were found, but crystallization of gypsum and weathering of marcasite in the matrix had reduced the remains to the point where they were not worth collecting. It is believed that no further paleontological salvage work is needed at this reservoir site.

The fossils collected during 1948 include no material of outstanding exhibit value. Despite their often fragmentary nature, however, they have considerable usefulness and importance for study purposes. Since much is still to be learned about the paleontologic horizons represented at Boysen and Canyon Ferry, it is highly desirable that further work be done prior to filling of the pool areas. Owing to the small size, marked rarity, and scattered occurrence of most of the fossils on these time levels, it has been found most economical and profitable to revisit the localities briefly in successive seasons and to collect the materials newly weathered from the clay beds. The grain-by-grain removal of matrix through normal agencies of erosion operating over considerable areas of fossiliferous deposits uncovers more material than would sustained or large-scale excavation, either by hand methods or with power equipment. In this respect, the fossil-collecting throughout many of the reservoir sites in Wyoming and Montana present problems quite unlike those confronting archeologists, or those faced by paleontologists preoccupied with large faunal forms and later geological horizons.

FIELD WORK BY COOPERATING AGENCIES

As in the preceding year, several State-supported agencies participated actively in the 1948 investigations at Federal water-control projects. There were three of these cooperating agencies in Nebraska, two in North Dakota, and one in Kansas. Five were engaged wholly in archeological investigations; the sixth conducted both archeological and paleontological work. The operations of these agencies were entirely on a voluntary basis, and involved no distribution of Federal funds. Where the cooperative work was done through a formal agreement between the River Basin Surveys and a particular agency, the latter has provided reports from time to time on its activities, and summaries of these reports have been included in the periodic and other statements of progress furnished the National Park Service by the Lincoln office of the River Basin Surveys.

This section of the present report is based largely on data supplied from time to time by the agencies concerned, either through statements of progress, through preliminary reports prepared for publication, or through discussions with field personnel. Some of the sites noted were visited by River Basin Surveys personnel while the field investigations by State agencies were under way. The courtesy of these agencies and their representatives in making available advance information on their findings is hereby gratefully acknowledged.

KANSAS

Archeological salvage operations in Kansas during 1948 were conducted by the University of Kansas Museum of Natural History. A party under the supervision of Carlyle S. Smith worked from June 19 to August 20 in the Kanopolis Reservoir area on Smoky Hill River and also outside the reservoir area along the Little Arkansas River in Rice County. The Kanopolis locality had been examined between August 4 and 10, 1946, by M. F. Kivett and J. M. Shippee for the Missouri River Basin Survey. Through the cooperation of interested individuals, including especially William O. Leuty, Corps of Engineers, and G. L. Whiteford, of Salina, a total of 18 sites was recorded in the 1946 survey. The advisability of a more intensive investigation and the probable need for systematic excavation at certain sites was pointed out in the preliminary report of that work. With virtual completion of the dam early in 1948 and the imminent flooding of many of these archeological locations, it became imperative that any salvage activity be undertaken immediatley. The Missouri River Basin Survey was committed to the limit of its resources elsewhere, and so the University of Kansas undertook what proved to be the final salvage effort on this reservoir site. Most of the sites in the pool area were submerged beneath the rising reservoir waters by the time the 1948 field work ended.

Kanopolis Dam, constructed by the Corps of Engineers, is on the Smoky Hill River about 12 miles southeast of the town of Kanopolis, in Ellsworth County. It has a height of 131 feet above stream bed, and a crest length of some 15,400 feet. At full pool (elevation 1,508 feet), slightly more than 13,000 acres of land will be under water, and the lake will extend upstream about 20 miles by river to a point just west of Kanopolis and within 3 or 4 miles southeast of Ellsworth.

In this section of its course, the Smoky Hill pursues a direction south of east. It flows in a flat-floored valley lined with rather abrupt bluffs capped here and there by outcropping ledges of Dakota sandstone. Lower portions of the valleys of several formerly permanent tributaries and canyons have now been flooded by the reservoir. These include Elm and Clear Creeks on the south, Bluff and Thompson Creeks on the north, and several short canyons near the dam. Native vegetation consisted of hardwood timber along the stream banks—chiefly cottonwood along the river, with elm and hackberry on the tributary creeks and in the canyons. The uplands, where not under cultivation, are covered with grass.

Archeological remains in the locality are of several kinds. They include petroglyphs, burial cairns, and occupational sites. Though these cannot in all cases be allocated to recognized cultural horizons or time periods, it is clear that a span of some centuries and the presence of several different native groups can be inferred.

In the immediate vicinity of the reservoir, there are at least three known petroglyph localities. The principal one, 14EW1, is a prominent sandstone cliff known locally as Indian Hill on the north side of the valley between Horse Thief and Red Rock Canyons, about 2½ miles northwest of the dam. Here human, animal, geometric, and other figures cover some 50 feet of the sandstone face. Horses and mounted figures, boatlike characters, and other items suggest that part of the gallery may be post-White contact; other portions may be considerably older. The underside of several large blocks that have rolled down the slope bear figures that were probably once included in the cliff front. Smith's party found at the base of the bluff a diamond-shaped flint knife, several end scrapers, and chert chips, perhaps left by the Indians who cut the figures into the sandstone face. There has been considerable disfigurement of the locality by picnickers; it lies above full-pool level and thus will not be flooded, but the likelihood is strong that further vandalism will eventually destroy most of the characters in what is probably one of the most extensive and interesting petroglyph sites in Kansas. The other known petroglyph localities hereabouts are 14EW7, known locally as Three Cave Farm, on the north side of the valley about 3 miles east of Kanopolis; and 14EW14, on Elm Creek about 2 miles north of its confluence with the Smoky Hill. Both these are relatively small and contain only a few characters.

Burial cairns at one time apparently occurred in some numbers on the bluffs along Smoky Hill River. Most of them, however, have been destroyed by removal of the stones for use in construction of fences. The University of Kansas party opened two of these structures at site 14EW13, at the extreme end of a ridge between Red Rock Canyon and Elm Creek overlooking the Smoky Hill Valley. Both contained small rectanguloid cists covered with sandstone slabs, but the burials that they presumably at one time held had disintegrated or been removed long ago. A flint chip and scraper fragment were the only included cultural materials.

A few miles outside the reservoir to the south, on top of a grassy butte overlooking a branch of Thompson Creek, four other cairns in a group of seven were opened. One, approximately 12 feet in diameter and 15 inches high, consisted of a rectanguloid cist measuring 30 by 66 inches surrounded by small, irregularly shaped stones and covered with slabs whose weight had crushed a flexed skeleton within. Most of the skull had disintegrated, and there were no artifacts present. The other three cairns contained no recognizable cists or burials, and were devoid of cultural materials. This site, located on the Hudson farm, has been designated 14EW24.

The occupational sites seen in 1946 and re-examined more carefully in 1948 suggest that at least three, and possibly four, pottery-making peoples were present at one time or another within the present reservoir limits. No large or impressive sites were noted at any time; areally limited sites with rather thin deposits suggest short-lived occupancies or perhaps transient residence by hunting parties from more permanent and larger communities situated elsewhere.

A single stratified site, 14EW6, was briefly worked in 1948. This lay on Thompson Creek, near its confluence with the Smoky Hill. From the two uppermost of four culture-bearing strata came potsherds of *Geneseo Plain* and *Geneseo Simple Stamped* types, a triangular projectile point, end scrapers, a mano fragment, and numerous fragments of animal bone refuse. These occurred in thin, dark soil strata, along with charcoal, ash lenses, and basin-shaped hearths underlain by fire-reddened earth. Judged by the cultural materials, these two levels belong to the Great Bend aspect, thought to be a Wichita manifestation flourishing in central Kansas between *circa* 1475 and 1675. A third and lower stained soil level also contained a few hearths, and yielded two small plainware sherds apparently of prehistoric pottery and identifiable as of either Upper Republican or Woodland type. The fourth and lowermost level had a few hearths and broken animal bones, but no artifacts from which cultural affiliations could be determined. These four culture-bearing strata evidently represent intermittent camp sites; the sterile intervening layers of sedimentary materials presumably were laid down by prehistoric flood waters from the converging creek and river.

The prehistoric Upper Republican culture is represented in collections from several small sites throughout the reservoir area. One of these localities, 14EW19, is on a terrace on Thompson Creek above the stratified site 14EW6. Others were noted in the vicinity of Clear Creek and on Elm Creek, where bits of burnt clay daub suggest the remains of earth lodges. None of these, however, could be excavated in the time and with the very limited manpower available.

Woodland materials were also noted at a number of small sites in the locality. One of these, 14EW12, at the mouth of Elm Creek, showed a thin deposit of Woodland pottery in one portion, whereas Upper Republican materials occurred in other parts. With respect to tempering, the Woodland pottery suggests two variants, one characterized by angular calcite fragments, the other by rounded sand grains or crushed quartz. Small-stemmed or corner-notched projectile points with barbed blades also occurred here, as well as planoconvex end scrapers, a chipped celt, and numerous side scrapers. At 14EW13, on the ridge overlooking 14EW12 from the east, and near the two disturbed cairns briefly noted above, were additional calcite-, shale-, and grit-tempered pottery fragments of apparent Woodland origin. Associated projectile points were small, mostly under three-quarters of an inch long, with sharp barbs and expanding stems; one had serrate blade edges. Other artifacts included planoconvex scrapers, a flat sandstone grinding slab, a perforated shell hoe, a small biperforate shell pendant, a T-shaped drill, and several side scrapers.

Some 10 miles south of Ellsworth, on a branch of Ash Creek, the University of Kansas party excavated an as yet unidentified subsurface feature with which were associated rocker-marked, dentate-stamped, zone-decorated, and other potsherds of evident Hopewell affinities. Corner-notched and expanded-base projectile points, chipped disks, flake knives, planoconvex scrapers, splinter awls, chipped celt fragments, sandstone abraders, and other items were also associated. Although no Hopewellian sites are on record for the Kanopolis Reservoir area itself, one or two sherds found on the surface by local collectors suggest that this horizon may have been represented by peoples who at times utilized or lived in the locality.

In summary, it appears from the salvage operations of 1946 and 1948 at Kanopolis Reservoir that the locality has been intermittently occupied on successive time levels by various native peoples. These demonstrably included representatives of: the Great Bend aspect, dated *circa* 1475–1675; the Upper Republican culture, preceding 1450; and one or more Woodland variants, which perhaps antedated A. D. 1200. It is possible that there were also Hopewellian peoples here, either coeval with the Woodland or somewhat later, but in any case preceding the Upper Republican. No trace has been found of any prepottery cultures here, nor is there any archeological evidence, unless it be in the petroglyphs showing horsemen, of the Cheyenne, Arapaho, and other late hunting peoples who are known to have roamed the area in the nineteenth century.

NEBRASKA

As in the preceding year, three State agencies engaged in cooperative scientific salvage work in Federal water-control projects in Nebraska during 1948. The Nebraska State Historical Society carried on archeological excavations at Medicine Creek Reservoir from early June until August 19, under the leadership of A. T. Hill, Director of the Museum. This work was a continuation of researches begun in the preceding summer. A summer field session of the University of Nebraska Laboratory of Anthropology, under Dr. J. L. Champe, excavated sites in Harlan County Reservoir during June and July; and subsequently this agency carried on limited reconnaissance at several proposed reservoir sites in the Lower Platte Basin in central Nebraska. The University of Nebraska State Museum had a paleontological party at work in the Medicine Creek Reservoir, and another at Harlan County Reservoir. From mid-July until August 25, archeological work was carried on by the Museum at a deeply buried prepottery site on Medicine Creek a short distance below the mouth of Lime Creek. The Museum researches were under the general supervision of Dr. C. B. Schultz and W. D. Frankforter; Mr. and Mrs. Preston Holder were in direct charge of the archeological studies at Medicine Creek.

A brief résumé of investigations and findings by these agencies at each reservoir project follows.

Harlan County Reservoir site.—The Harlan County Dam, now under construction by the Corps of Engineers, is on the Republican River 3 miles east of Republican City, Nebr., 13 miles west of Franklin, Nebr., and approximately 235 miles above the confluence of the Republican with the Smoky Hill River. Project plans call for an earth-fill structure with a height of about 106 feet above stream bed and a crest length of 11,950 feet. At full pool, elevation 1,973.5 feet, an area of about 53,500 acres will be under water, and the reservoir waters will extend northwest up the Republican Valley for approximately 14 miles, to a point above Orleans, Nebr. Another arm of the reservoir will reach southwest up the valley of Prairie Dog Creek to a point near the Kansas-Nebraska State line just north of Woodruff, Kans. Purposes of the dam are flood control and irrigation.

In the vicinity of the reservoir, the Republican flows through a flat-floored valley from 1 to 2 miles wide, bordered by extensive bottoms and enclosed by loess bluffs. Terrace remnants occur at varying heights above the channel of the main stream as well as along its larger tributaries. Gently rolling loess hills lie to the north of the river valley, while the region on the south tends to be somewhat more dissected and broken. Cottonwood, willow, box elder, elm, and ash fringe the watercourses and the base of the bluffs, especially along the south side of the valley, and small game and fur bearers still exist in some numbers. The bottoms and much of the uplands are in cultivation, but extensive areas are still used for hay and pasture.

It has been known for some years that aboriginal village and burial sites exist in considerable numbers along the Republican and its smaller perennial tributaries. Systematic investigations on a modest scale have been made from time to time at various localities along its course. At the beginning of the nineteenth century, the Pawnee had at least two villages of earth lodges near the point where the stream leaves Nebraska to enter Kansas—one near Guide Rock, in Webster County, Nebr., and another near Republic, Kans. Evidences of several earlier peoples also are present; some of these were clearly horticultural, at least in part, but others seem to have relied largely or entirely on hunting and gathering for their subsistence economy. The accumulating evidence suggests that these different peoples probably did not originate in the same locality or from the same basic culture complex, but that they were of diverse origins and antecedents. For most of the complexes indicated, however, the available information has been rather meager, resting on the scattered sampling of many sites rather than on the intensive and comprehensive examination of a few key sites.

The Harlan County Reservoir site was first examined by a River Basin Surveys field party, consisting of M. F. Kivett and J. M. Shippee, during the summer of 1946. Their operations, carried on from August 20–25, consisted of surface collecting, some small-scale test-pitting, and interviews with local and other persons familiar with the locality and its antiquities. Earlier investigations by the Nebraska State Historical Society and the University of Nebraska Laboratory of Anthropology also supplied helpful leads in this survey. In November, several of the more promising locations were rechecked, and one burial site, 14PH4, was excavated.

From these investigations, it was determined that of 23 known sites in the vicinity of the reservoir, including 16 native occupational and 7 burial areas, 14 apparently lay below the 1,973-foot contour level and would be inundated at flood stage. Six others lay below the 2,000-foot level where it seemed likely that erosion by wave action or otherwise might affect them adversely; and three occurred under conditions that suggested they would very likely be damaged by construction work. Moreover, it was apparent that not less than four archeological complexes, probably involving a time span of as much as a thousand years, were represented within the limits of the future pool area. Included among these are Woodland variants, Upper Republican and Dismal River sites, and at least one apparently assignable to an unnamed but probably late pottery horizon also represented elsewhere in eastern Nebraska and northern Kansas.

Since the nature of certain of these complexes, as well as their interrelationships, remain obscure, it seemed highly desirable that systematic excavations be carried out before the sites were destroyed by the rising reservoir waters. Because of inadequate funds and prior commitments elsewhere, the River Basin Surveys were unable to undertake the needed investigations here. The University of Nebraska Laboratory of Anthropology was accordingly invited to make such investigations as seemed desirable and feasible, especially in the lower portion of the future pool area. That agency accepted, and took over the work of exploring certain especially promising sites on the banks of Prairie Dog Creek.

The principal site worked, 25HN37, is located on the left bank of Prairie Dog Creek about 3 miles above its confluence with the Republican, and some 6 miles southeast of Alma, Nebr. Occupational remains here are scattered over an area at least 1,000 feet long and 250 feet wide, along the rim of a terrace which forms a bluff perhaps 30 feet high on the north bank of the creek. With the aid of machinery, a trench nearly 800 feet long was opened along the edge of the site terrace overlooking the creek. A fire-pit uncovered near one end of the trench led to widening of the cut over what was subsequently identified as a house site. Similar features were worked out in association with each of three fireplaces located in tests made by Kivett and Shippee in November 1946. Not far from the house sites, a roasting pit was also opened.

The house sites, as defined, each consisted of five post holes arranged symmetrically around an ash-filled fireplace, to form a pentagon from 12 to 15 feet in diameter. Within this pentagon, charcoal and debris were mixed throughout the earth to a depth of 5 or 6 inches below the level of the top of the fireplace. No evidence of an outer ring of postholes could be found. In three cases, a pair of smaller postholes was found 12 or 13 feet from the pentagon on the east side, possibly representing the outer end of a doorway. There were no traces of wattling clay, such as often occurs in the more familiar earth lodge sites of the Central Plains. Details of construction for the habitations here represented are uncertain, but it seems clear that the lodges must have differed rather widely from the earth lodges of the Pawnee and other semisedentary village tribes. There were no cache pits within the house sites.

The roasting pit lay not far from the three houses. In cross section, it was bell-shaped, with walls and bottom burned a bright red. It measured 25 inches in depth, with a diameter at the orifice of 40 inches and at the floor of 52 inches. Ash, clay, earth, and charcoal strata, along with animal bone and some artifacts, filled the pit.

Artifacts were not abundant in the excavations, but the limited sample so obtained and the rather extensive series of materials collected from the cultivated site surface leave little doubt regarding the cultural affiliations of the site. Potsherds are thin, hard, and fine-textured, usually dark in color, with fine sand or mica tempering; exterior surfaces are plain or simple-stamped; and rims are moderately high, slightly flared, and have rounded or flattened and everted lips. No recognizable puebloan sherds or other trade artifacts are reported. Other artifacts include numerous end scapers; scraper-graver combination tools; drills of several forms; triangular projectile points with or without side notches; sandstone abraders; bison scapula hoes and choppers; fleshers without serrate blades; bison-rib shaft wrenches; broken awls; long tubular bone beads. Bison, deer, beaver, turtle, and other bone refuse occurs. No evidence of white trade contact was found in situ, though some of the surface iron and brass may have belonged to the Indian occupants.

A report on the 1948 findings at 25HN37, prepared by Champe, has been published in the April 1949, issue of American Antiquity.

The University of Nebraska State Museum was represented at Harlan County Dam by two students. In the early part of the summer, while construction work was suspended because of a labor strike, these men spent their time prospecting for fossils in the vicinity of the reservoir. Several promising Pliocene quarries were located, all outside the future pool area. Upon resumption of construction activities, the Museum representatives devoted their time to watching the excavations for paleontological remains and to tests at some of the newly discovered localities nearby. During the winter, a new fossil quarry at the south end of the dam axis was reported to the Museum by Corps of Engineers personnel, but adverse weather prevented investigations during the remainder of the calendar year.

Medicine Creek Reservoir site.—The 1948 investigations of the Nebraska State Historical Society here involved the excavation of house units and refuse areas at six village sites, and test excavations at a seventh. The sites selected lay on the right (west) bank of the creek, outside the then federally owned lands and mostly upstream from those under study by the River Basin Surveys. Two of the sites, 25FT19 and 25FT20, lay just south of Lime Creek; the others were all within a distance of approximately 2 miles to the north. At none were the remains present completely worked out.

Sites investigated, with the principal features opened in each, include 25FT19, two house floors and one midden; 25FT20, one house floor; 25FT22, two house floors and two middens; 25FT28, one house floor and one midden; 25FT30, five house floors and one midden; 25FT39, two house floors and two middens; 25FT23, tests only. All the house floors uncovered were subrectangular in form and lay a few inches to approximately 2 feet underground; characteristically, they showed four primary or central postholes. These structural evidences, the pottery remains, and the work in chipped and ground stone, in bone, shell, and other materials all conform closely to the larger series obtained in the River Basin Surveys excavations nearby. By extending the foundation of controlled data on which laboratory analysis and interpretation are based, these remains constitute an important supplement to the data gathered at various times by other agencies, Federal and non-Federal, in the Medicine Creek locality. There are, to be sure, some variations from site to site; but the materials collected by the Historical Society in 1948 can undoubtedly be safely ascribed to the Upper Republican horizon. It is not possible at the moment to assess the site variations in terms of possible time or other significant differences.

Archeological work at Medicine Creek by the University of Nebraska State Museum consisted of excavations at a deeply buried prepottery site designated 25FT50. This is located in the right (west) bank of Medicine Creek a few hundred yards downstream from the mouth of Lime Creek, on which two other early prepottery sites, 25FT41 and 25FT42, had previously been worked. At site 25FT50, the cultural materials occurred in a zone about 2½ to 3 feet thick in the lower part of a terrace fill provisionally identified by Museum paleontologists as Republican River Terrace 2. There were two levels of concentrated debris and stained soil separated by a lighter colored intermediate zone in which much less cultural material was found. Most of the artifacts and about half the hearths uncovered were in the lower level, designated Occupational Level 1. Scattered about through the occupational refuse were numerous animal bones, including bison, antelope, deer, coyote, rabbit, and smaller forms, as well as occasional reptiles, amphibians, and birds. Most of the larger bones had been cut, broken, or otherwise modified by human industry; there were no large mammal skulls. Artifacts included leaf-shaped projectile points with concave base; trapezoidal scrapers, some with gougelike bits; ovoid and lanceolate blades; drills; abrading or grinding stones; a flattened stone spheroid with equatorial groove; eyeletted bone needles; crude bone awls; a bipointed bone object; and miscellaneous cut and worked bone fragments. Some of the specimens show a general resemblance to artifacts from the later pottery horizons of the locality; but others, such as the projectile points, gougelike scrapers, and perhaps the grooved stone are reminiscent of earlier horizons. Also the depth of overburden argues strongly for an age considerably greater than that of the Woodland and Upper Republican pottery sites found in the immediate vicinity but under different physiographic conditions.

A preliminary statement by Mr. and Mrs. Holder regarding the findings at 25FT50 has been published in the April 1949, issue of American Antiquity.

Paleontological researches by the Museum at Medicine Creek included work at two Pliocene fossil deposits, 25FT40 and 25FT47, which were endangered by construction of an access road. From 25FT40 were gathered the remains of some 25 species of insectivores, rodents, carnivores, perissodactyls, artiodactyls, fish, birds, and other vertebrates, some of them reportedly representing new species. These forms are said to "represent the latest Pliocene assemblage so far discovered in the Great Plains region and therefore will be of utmost importance in establishing the Pliocene-Pleistocene boundary . . . Several specimens are the largest recorded from the Pliocene of the Great Plains and probably represent the latest survivors of their times."

At 25FT47, the faunal list is much shorter; the quarry has been tentatively identified as Ash Hollow (Middle Pliocene) in age.

ARCHEOLOGICAL RECONNAISSANCE IN THE LOWER PLATTE BASIN

The Lower Platte Basin includes that portion of the Platte River watershed lying east of Lake McConaughy, near Ogallala in Keith County, Nebr. The Platte itself courses generally eastward near the southern boundary of the basin. In eastern Nebraska, it is joined from the north by two major tributaries—the Loup near Columbus, and the Elkhorn near Ashland. These two tributaries drain much of the Sandhill and Loess Plains areas of central and eastern Nebraska.

Water development plans of the Bureau of Reclamation for the lower Platte Basin include construction of about 16 major reservoirs. Most of these will be distributed in a belt some 50 miles wide extending from northern Gosper County northeastward to Antelope County; others lie outside this belt to the north on the upper reaches of the Loup system, or else to the eastward about the confluence of the Loup and Platte Rivers.

Preliminary examinations of several of the proposed reservoir sites in this region were made in May 1947, by a party from the River Basin Surveys. Projects visited at that time include Amherst, Buffalo Creek (renamed Bison), Cairo, Ericson, Mullen, and Rockville. Also traversed at the time was Brewster, where, however, no actual survey was attempted. Preliminary reports of the findings at the several projects here listed have been issued, although in no case was complete coverage of the future reservoir area possible.

In 1948, the University of Nebraska Laboratory of Anthropology undertook reconnaissance at several additional projects proposed for the Lower Platte Basin. This work was carried on over a period of 3 weeks, from August 15 to September 2, following termination of the Laboratory's excavation program at Harlan County Reservoir. Two university students in anthropology, J. H. and D. Gunnerson, made the actual field investigations, under the general supervision of Dr. J. L. Champe. Units visited include Cushing, in Howard and Greeley Counties; Loretto, in Boone County; Plum Creek, in Gosper County; and Rosedale (formerly Clearwater) in Antelope County. Cushing, Loretto, and Rosedale are located north of the Platte River; Plum Creek lies just south of that stream in south-central Nebraska.

The observations of the Laboratory field party at the four reservoir sites visited would seem to indicate that the water-control projects will directly affect a number of aboriginal sites representing various time levels and several cultural complexes. These include remains apparently assignable to the certainly prehistoric Woodland and Upper Republican horizons; and also the traces of one or more later prehistoric, or possibly protohistoric, peoples whose identity has not yet been established. Further surveys at all four reservoir sites, and probably some excavation, are believed to be warranted by the new evidence now at hand.

Cushing Reservoir site.—The site of the proposed Cushing Reservoir is on Spring Creek in Howard and Greeley Counties, Nebr. Spring Creek enters the Loup River from the north just below the junction of its North and South Forks. The proposed dam site is a short distance northwest of the town of Cushing, from which point the reservoir will extend upstream to the vicinity of Wolbach, in Greeley County. The maximum water surface area will be about 1,700 acres.

Seven archeological sites, all lying below the 1,850-foot contour, were recorded in the future pool area by the University of Nebraska Laboratory of Anthropology field party. Five of these yielded pottery remains as well as other occupational debris; on the other two, only bone fragments, stoneworking refuse, chips, and similar materials were found. Of the pottery sites, three yielded sherds of Upper Republican type and one had sherds suggestive of Woodland wares. From one site came a rather curious assemblage of pottery fragments including several grit-tempered sherds apparently in the Upper Republican-Nebraska culture tradition; others of different type with broad shallow grooves and trailed horizontal lines occasionally cut by diagonals; and one fragment with horizontal single-cord impressions on the rim exterior and cord-impressed diagonals on the outer edge of the vessel lip. From the limited observations made, it is not clear whether a stratification of archeological complexes is here indicated, or whether some other interpretation will be called for.

The occurrence of grass-impressed wattling clay on several sites suggests the former presence of earth-covered habitations of fairly substantial character. These, in turn, would imply a fairly sedentary mode of life on the part of the erstwhile inhabitants, and possibly a semihorticultural subsistence economy.

Loretto Reservoir site.—The proposed Loretto Reservoir is to be located on Beaver Creek in Boone County, Nebr. Beaver Creek joins the Loup River from the north near Genoa, some 25 or 30 miles southeast of Loretto. The dam site is not far above Loretto, whence the pool will extend about 8 miles northwest along the Beaver. At maximum proposed pool elevation of 1,849 feet, an area of about 2,360 acres will be under water.

Seven sites of archeological interest, all situated below the 1,900-foot contour, have been recorded for the Loretto Reservoir site. Since a heavy growth of weeds covered much of the ground surface, it is quite probable that additional sites remain undiscovered. Pottery remains were found at four sites; and, while the samples collected were not large, they suggest the former presence of at least three different pottery-making peoples. Small Woodlandlike pottery fragments occurred at two sites; another yielded a sherd of apparent Upper Republican type; and still another had "hole-tempered" sherds, one of which bore deep trailed parallel lines as surface decoration. These are pottery types not generally expected to occur on the same time level; and they suggest that the locality may have been occupied or visited at different times by representatives of successive widespread aboriginal cultures.

The three nonpottery sites were characterized by bone fragments, chips, and other village-site refuse; there is no way of determining at the moment the relationships of these remains to those of the pottery-using natives of the locality.

Plum Creek Reservoir site.—The site of the proposed Plum Creek Reservoir is on Plum Creek in northern Gosper County, Nebr., a few miles south of the Platte River. No data on size and operation of the proposed project are available at this time, other than a map prepared by the Tri-County Project, P. W. A., in 1941. This shows two different reservoir sites; both are in Gosper County, but the upper extends a short distance into Frontier County. Both locations were examined by the Laboratory party, but torrential rains and the resulting impassible roads cut short the survey of the upper site.

Ten archeological sites were recorded in this locality during the 1948 survey. With a single exception, these were marked only by occasional bone refuse, and by flint chips, cores, and other nonceramic remains. The one exception is a hilltop site, 25GO20, where potsherds, chips, cores, burned and unburned bone scrap, and other materials were picked up. Much material is reported to have been found at this spot in past years by local collectors; and of the sites seen by the 1948 survey party, this one seemed the most promising and prolific.

Judged from the potsherds seen, the site appears to be attributable to the Upper Republican horizon.

Information from local collectors indicates that pottery-bearing village sites assignable to Upper Republican peoples occur on Turkey Creek, tributary of the Republican River, in southern Gosper County, but that only a single site of this complex—25GO20, noted above—has been recognized to date in the Plum Creek Reservoir area.

Rosedale Reservoir site.—Location of this proposed project, formerly called the Clearwater Reservoir, is on Clearwater Creek in Antelope County, Nebr. Clearwater Creek is a permanent stream emptying into the Elkhorn River from the southwest a few miles below the proposed reservoir and east of the town of Clearwater. The dam site is to be approximately 2 miles south of the town of Clearwater and 9 or 10 miles west of Neligh. The reservoir pool will extend about 6 miles up the creek, to or slightly beyond the Holt County line. At maximum level, 2,850 acres will be under water. The surrounding terrain is gently rolling to hilly, with extensive sandy areas; the creek valley has low terraces rising 8 to 10 feet above the flood plain and a fringe of hardwood timber along the stream banks.

Despite the comparatively small area involved here, archeological sites appear to be fairly plentiful and of varied character. Eleven sites were recorded in the 1948 survey by the Laboratory of Anthropology; it is very probable that others remain undiscovered. Six of the sites yielded no pottery whatsoever; their age and cultural affiliations cannot even be guessed at with the meager evidence now at hand.

Potsherds strongly suggestive of Upper Republican wares were found on two sites; in one instance, they occurred at a depth of 24–30 inches in a road cut. In another site they seemed to be coming out of a shallow buried stratum, along with other debris and sherds of possible Dismal River affiliations. The suggested association, and in any case the exact stratigraphic relationships here, deserve further investigation. Three other sites yielded sherds with shell and/or grit tempering, simple stamped exterior surfaces, and parallel horizontal trailed lines which had evidently encircled the rims of the vessels. This material is somewhat reminiscent of ceramic remains found previously at Ericson, Harlan County, and other reservoir sites, as well as elsewhere in north-central Nebraska. In general, this material gives the impression of being relatively late in time, but since none of the sites in which it occurs has yet been comprehensively excavated and described in print, the complex represented remains pretty largely unknown and is still unclassified.

NORTH DAKOTA

In North Dakota, cooperative archeological salvage work was carried on by a field party from the University of North Dakota, working in conjunction with the North Dakota Historical Society. Under the active supervision of Dr. Gordon W. Hewes, a party of six was in the field at the Baldhill Reservoir from June 25 to August 1, 1948. During this period, two burial mounds were opened and several village sites nearby were briefly test-pitted. Unfavorable weather and a consequent delayed crop season, which prevented access to several promising bottomland village sites, hampered the operations. This work, it should be noted, followed a reconnaissance for the River Basin Surveys during 1947 by a party of four, under M. F. Kivett, at which time three mound groups and seven occupational sites were recorded. Kivett's party also partially excavated a burial mound in Griggs County to salvage exposed skeletal material, and recommended further work in the region.

Baldhill Reservoir site.—Baldhill Dam, a Corps of Engineers project, is under construction on the Sheyenne River, 16 miles upstream from Valley City, N. Dak., and about 271 miles above the mouth of the stream. It is to be an earth-fill structure having a height of approximately 61 feet above stream bed and a length of 1,650 feet. Purposes of the project are flood control, water supply for industrial and municipal use, and pollution abatement.

For the 1948 investigations by the University of North Dakota-North Dakota Historical Society party, two mounds in Barnes County were selected. These were designated as site 32BA1 by the River Basin Surveys. They lay about 90 yards apart on the left bluff of the Sheyenne River nearly one mile below its junction with Baldhill Creek, and some 60 or 70 feet above the river. Both mounds were approximately circular in outline, perhaps 100 feet in diameter, and between 6 and 7 feet in height. They appeared to have been built wholly of topsoil gathered up nearby, without any preliminary clearing away of the topsoil on the spot over which they were erected. Beneath one of the mounds, the original soil surface was marked by a fine layer of carbonized grass stems and ash, suggesting that the grass had been burned off before the tumulus was built. Glacial boulders, of which many occurred on the field surface about the mounds, had been freely incorporated in the mound fill. No humus layers or other significant stratigraphic features were noted in the mound sections; both appear to have been constructed within a relatively short span of time rather than by gradual long-term accretion.

Upon excavation, both mounds were found to have a central underlying burial pit whose fill contained fragmentary and disarticulated human skeletal remains of all ages and both sexes. The central pit in Mound B measured 11 by 5 feet, with a depth of 3 feet or more beneath the original ground surface. These pits had evidently been roofed over with transversely laid oak timbers which, in the case of

Mound B, rested on rows of glacial boulders set along the sides of the pit. It is presumed that the space below the timbers was left open when the mound was built, and became filled with soil and rocks when the timbers finally decayed. Mound A contained a second shallower pit without roof, just east of the principal chamber. In this were found four partially articulated and moderately well-preserved adult skeletons, apparently buried together side by side and alternately oriented.

Artifacts were not plentiful in either mound, nor were they of such nature as to be very helpful in determining the cultural affiliations and chronological level of the associated skeletal materials. From Mound A came a medium heavy stemmed projectile point; a heavy bone punchlike object; a human molar with ground-off root; an end-perforated freshwater mussel-shell ornament; a painted bird-bone tube fragment; four partly worked or ground carnivore teeth; a complete human upper dental arch and palate carefully cut and ground down along with its included teeth; and miscellaneous scrapers, flakes, etc. Mound B yielded a small cylindrical copper bead, a clay bead (?), a crudely chipped-stone digging (?) tool, and one complete and one fragmentary bison-rib beaming or smoothing tool. The disintegrated skull, ribs, and vertebrae of a bison, possibly stained or painted, lay just above the fill near one end of the central grave pit in Mound B.

A preliminary report on the 1948 findings at Baldhill has been published by Hewes in the April 1949 issue of American Antiquity. As pointed out there, it is hoped that further study of the physical anthropology of the intact and restorable human remains from these two mounds, plus dendrochronological analysis of the log fragments from the burial chamber will throw further light on the difficult problem of dating and identifying culturally the eastern Dakota burial mounds. In certain particulars the Baldhill mounds opened by Hewes are reminiscent of findings by Montgomery, Strong, Meleen, and Cooper at other burial mounds in eastern North and South Dakota; but, unfortunately, the complex as such cannot yet be specifically and directly related to that at any other reported mound sites of this general region or of the Minnesota woodlands to the east.

RÉSUMÉ AND CONCLUSIONS

In the foregoing pages, we have briefly reviewed the archeological and paleontological field work carried on in the Missouri River Basin during calendar year 1948 by the River Basin Surveys and cooperating agencies, in conjunction with the Federal water-control program. Archeological investigations by River Basin Surveys parties included extended excavations at Medicine Creek, Nebr., and at Fort

Randall, S. Dak.; surveys and test excavations at Angostura, S. Dak., at Heart Butte, N. Dak., and in the lower Oahe Reservoir site, S. Dak.; and reconnaissance at Oahe, Pactola, and Johnson Siding, in South Dakota, and at Edgemont and Keyhole, in Wyoming. Paleontological work by the River Basin Surveys included re-examination and collecting at Boysen Reservoir site, Wyo.; at Canyon Ferry, Mont.; and at Cedar Bluff, Kans.

Cooperating agencies, and the localities investigated by each, included the following: University of Kansas Museum of Natural History, at Kanopolis, Kans.; University of Nebraska Laboratory of Anthropology, at the Harlan County, Cushing, Loretto, Plum Creek, and Rosedale Reservoir sites, Nebr.; University of Nebraska State Museum, at Harlan County (paleontology) and Medicine Creek (archeology and paleontology), Nebr.; Nebraska State Historical Society, at Medicine Creek, Nebr.; University of North Dakota–North Dakota Historical Society, at Baldhill, N. Dak.

These investigations represent a widely scattered sampling—spatially, temporally, and culturally—of the aboriginal remains of the Missouri Basin region. From Kansas to North Dakota, in a variety of ecological settings, the traces of native pre-White and early contact peoples came under observation and detailed study. In some instances, important new data were added to previous records of the prehistory of the localities involved, and the place of these findings in the over-all picture of native life in the Great Plains was made appreciably clearer. Elsewhere, the findings are represented by data inadequate as yet to permit exact placement of the remains in the present scheme of things. Despite the uncertainties and differences of opinion attached to some of the discoveries and their interpretation, it is clear that our knowledge of human prehistory in the Basin has advanced materially over the past year as a result of these researches. It is also clear that many of the problems now puzzling the archeologist here cannot be solved without the assistance of qualified students from other disciplines. With the archeological manifestations often are linked various phenomena having to do with past climatic variations, depositional and erosional problems, stream changes, and other matters of much importance to the student of human prehistory but for the most part beyond his particular abilities of interpretation.

Included in the 1948 archeological field work are several sites whose age almost certainly is to be measured in terms of millennia rather than of centuries. These are the Allen site, 25FT50, in Medicine Creek Reservoir, Nebraska, and the Long site, 39FA65, in Angostura Reservoir, South Dakota. At Medicine Creek, site 25FT50 is one of a group of three that have been under study since 1947. Sites 25FT50 and 25 FT41, the only ones so far comprehensively investigated, have been assigned by University of Nebraska paleontologists to the basal portions of Republican River Terrace 2, which is provisionally equated with the beginning of the Mankato substage of the Wisconsin glaciation. If this correlation is correct, the sites in question would antedate Eden Valley Yuma and also the Lindenmeier Folsom horizon, as these have been dated by other geologists. Presumably, they would also equate in time with the native horse, the Columbian mammoth, and *Bison antiquus*, as the stratigraphic range of these mammals has been reported for Nebraska. Despite the fact that the Lime Creek sites, especially 25FT41 and 25FT50, have produced a considerable amount of refuse animal bone, there is as yet no published proof that any of this material represents extinct forms, or that the bison remains found are other than those of the modern plains species. That the sites involved are in or near the base of one of the older terrace fills of the local drainage system is clear; but until the faunal and geological evidence bearing on the sites has been fully detailed and verified, the estimates of antiquity suggested by the paleontologists concerned must be viewed with reserve.

So far as the archeological complex, or complexes, at Lime Creek are concerned, there is little at the present writing to substantiate the placing of the material chronologically anywhere near or previous to the Lindenmeier Folsom horizon, where the association with extinct bison, *B. taylori*, seems well documented and is generally accepted. With exception of certain projectile points, most of the stone and bone artifacts so far reported from Lime Creek can be duplicated in any large collection of materials from Upper Republican and other archeological complexes in southern Nebraska, even though the latter have no historical connection and are without question from a much later time level. As a complex, it seems to me that the materials from the Allen site are rather more reminiscent of the remains from Signal Butte 1 than of any defined Folsom complex; whether further excavation would heighten or lessen this general similarity I have, of course, no way of knowing. More detailed and extended analyses and comparisons than have yet been made are needed before this problem and the true relationships of the Lime Creek materials can be settled.

At Angostura, site 39FA65 is an occupational zone of considerable extent but with as yet very limited material culture inventory. Simple fireplaces are present; as in the Lime Creek sites, no stone seems to have been used in connection with these features. Occupation appears to have been intermittent and of short duration, apparently along the edge of a creek valley whose contours were unlike those of the present valley. Several "early" point types have been found on the eroded edge of the site; in similar position, as well as in the culture stratum, have been found several fragments of lanceolate points characterized by narrow straight to concave bases, fine flaking, and ground basal edges. These have some similarity to certain specimens from the Allen site, and also to a series of well-made blades collected by Roberts in 1942 from a bison kill in the Agate Basin between Lusk and Newcastle in eastern Wyoming. It is presumed that the inhabitants of site 39FA65 subsisted mainly on large game, but to date bone fragments have been strangely absent. It is not clear whether this is attributable to local soil conditions or to other factors. Further work at this promising and important site is planned for 1949.

Presumably later in time than the occupation of the Long site at Angostura were a series of poorly defined and meagerly represented complexes found along the upper reaches of the Cheyenne and its tributaries in southwestern South Dakota. In the vicinity of the Angostura Dam there are several sites exhibiting physical stratification in the form of dark soil horizons of varying thickness, separated by noncultural deposits. Archeological remains occur in the darker soil formations, chiefly as fireplaces of various kinds with which are associated very limited quantities of other cultural materials. There is some stratigraphic evidence that simple hearths built on a layer, or within a circle, of stone may be a rather early form; that this type was superseded by a shallow basin partly filled with stones; and that this in turn was followed by pits whose diameter and depth were approximately equal, whose sides and bottoms were hardened and reddened by prolonged heating, and which usually contain fire-cracked stones and sooty soil. The last type is reminiscent of the somewhat similarly shaped but usually larger roasting pit of the protohistoric Dismal River horizon in the upper Kansas-Republican drainage. There are some slight indications that the projectile points and other artifacts found sparingly in association with each of the hearth types may be distinctive, but the available samples are too small to be conclusive. At some sites, manos, metates, and fragments are rather plentiful; elsewhere they are scarcer or wholly absent. Seasonal shifts of emphasis in food-getting, rather than distinct culture complexes, may be indicated by such differences. It is noteworthy, too, that few of these sites show any great quantity of animal bone refuse such as one would expect if the occupants had relied largely on hunting for their subsistence. This may mean that most of the slaughtering was done outside the living area, and only the edible portions of the game brought into camp; but somehow this is not a very satisfying explanation.

The findings at Medicine Creek and at Angostura, insofar as they involve the remains of nonpottery-making peoples, are of interest for several reasons. In the first place, they help to fill in some of the long and little-known intervals of time during which the Great Plains were certainly inhabited, if sparsely, before the arrival of pottery-making semihorticultural peoples in the western plains. They indicate, or strongly suggest, recurrent short-term occupancies in many localities throughout a wide area that today impresses one as rather uninviting and inhospitable. At the same time, the very meager material culture assemblage from nearly all sites so far found probably indicates a plane of living but little above a bare subsistence level and far below that characteristic of the historic horse nomads or the semihorticultural Indians of late prehistoric, protohistoric, and historic times.

No less important to Plains prehistory than the foregoing are the additional data gathered during 1948 concerning the pottery-making Indian inhabitants of the region. These, in general, are probably from a later period than the materials considered above; but it must be emphasized that not all of the potteryless horizons at Angostura, for example, can be proved to be earlier than some of the ceramic complexes in and east of the Black Hills. It is possible that Woodland and Upper Republicanlike penetrations here will be found to interdigitate with some of the later lithic horizons of the upper Cheyenne drainage. At the moment, direct stratigraphic evidence bearing on this question is not at hand.

Nothing in the 1948 findings in the Missouri Basin controverts the long-held view that, among pottery-bearing complexes, those designated as Woodland are the earliest in the region. It is perhaps more nearly correct to speak of a Woodland series, since there is growing evidence of more than one trait assemblage within what has been called the Woodland horizon. Kivett has proposed the term "Keith focus" for a group of sites in southern Nebraska and western Kansas which are partially characterized by calcite-tempered, cord-roughened pottery; small stemmed or corner-notched projectile points, sometimes with serrate blades; small chipped celts; tubular bone beads, either plain or with encircling incisions; and secondary burials in communal ossuaries which also contain great numbers of shell disk beads, triangular corner-perforated shell pendants, and certain other traits. The two Woodland habitation sites—25FT18 and a small area in 25FT70—excavated at Medicine Creek Reservoir area in 1948, may be assigned to the Keith focus, and it seems probable that the same or a similar complex is represented at Kanopolis Reservoir in Kansas. At both Medicine Creek and Kanopolis, the Woodland sites are small, the artifact yield is low, and evidence of maize-growing is nonexistent. In general, one gets the impression that small population groups and a rather simple hunting and gathering subsistence economy, albeit one with a well-established pottery tradition, are to be inferred.

Probably also assignable to a Woodland horizon are the mounds excavated in the Fort Randall Reservoir area—39CH4 and 39CH9. As already noted, some of the individual traits at these burial sites occur in widely separated localities from northern Kansas to Minnesota. Presumably the structures, whose associated village complex remains unknown, represent a western extension or variant of one of the Minnesota Woodland cultures. The mounds opened by Hewes at Baldhill lack many of the material traits found scatteringly in other burial structures around Devils Lake and elsewhere in eastern North and South Dakota, but in all probability likewise have a basic relationship to some Woodland manifestation of the Minnesota region. Neither the Fort Randall mounds nor those at Baldhill show a very close similarity as complexes to anything called Woodland in the central Plains.

Woodland potsherds from several occupational sites in Fort Randall Reservoir, though few in number, suggest at least two other variants with counterparts to the south in Nebraska. Sherds decorated with single-cord impressions are reminiscent of pottery from sites on Eagle Creek, in Holt County, and from Loseke Creek, in Colfax County. Others have punched rim bosses and exterior cord-roughening. To what extent these and other slight but seemingly consistent pottery variations are paralleled by differences in other material traits remains to be determined. Such a definition of the several variants now lumped together as Woodland, and determination of their relative temporal position, would be a long step ahead in the understanding of plains prehistory.

It has been noted above that evidence of maize-growing by the Woodland peoples on Central Plains sites is very scanty or else is altogether wanting. For the northern plains, in the Dakotas on both sides of the Missouri River, there is virtually no published information from which the nature of the local Woodland subsistence economies may be judged. It may be surmised that the westerly manifestations represent largely nonhorticultural peoples, whereas the easterly ones in which burial mounds occur may prove to be semihorticultural; but this is sheer conjecture and needs verification or correction.

In the Central Plains region of Kansas and Nebraska, the post-Woodland archeological complexes for the most part represent peoples whose subsistence economies were based to greater or lesser degree on maize-bean-squash horticulture. Long before introduction of the horse by European invaders, small unfortified villages composed of rectangular semisubterranean earth-covered lodges were scattered along the smaller stream valleys from the Smoky Hill drainage northward through Nebraska and apparently into the Dakotas. The extensive excavations at Medicine Creek in a series of Upper Republican village sites afford a good insight into the nature of this early semihorticultural occupation of the Great Plains. It is noteworthy that neither the comprehensive work by the River Basin Surveys at Medicine Creek nor the widely scattered earlier investigations by other agencies in and about the Kansas River Basin have disclosed any satisfactory evidence of trade or other contacts between these prehistoric Plains communities and their contemporaries in the Pueblo region of New Mexico.

Materials probably assignable to the Upper Republican horizon were found during 1948 at Kanopolis, at Harlan County, at several of the small proposed reservoir sites surveyed in the Lower Platte Basin by the University of Nebraska Laboratory of Anthropology, and on one or two sites at Angostura Reservoir. With exception of the last-named occurrence, all of the localities listed are within the previously known range of the Upper Republican culture. Several variants apparently exist, and these may have temporal significance. It seems likely that the large mass of data obtained at Medicine Creek, under carefully controlled conditions and in a relatively limited locality, will make possible a beginning toward separation into more or less distinct site or horizon complexes. It will be interesting to see, when more intensive work has been done, whether the sites tentatively assigned to the Upper Republican at Angostura will continue to be so classified; and also whether they show any evidences of horticulture or, alternatively, are to be interpreted as seasonal hunting camps for peoples normally resident farther to the east or south. The relationships of the central plains Upper Republican materials to certain sites along the Missouri in the Fort Randall Reservoir area, where cord-roughened body sherds and incised rims of collared form bring to mind the pottery remains at Medicine Creek, are still to be worked out.

On a later time level than the Upper Republican culture are several sites tested or more intensively worked at Kanopolis, Harlan County, Angostura, and other proposed or potential reservoir areas. At Kanopolis, near the junction of Thompson Creek and Smoky Hill River, two levels of a stratified site (14EW6) yielded pottery and other remains attributable to the protohistoric Great Bend aspect. This complex, which appears to represent a sixteenth and early seventeenth century Wichita (?) occupation, occurs at several large village sites, marked by middens, cache pits, and other evidences of a fairly sedentary semihorticultural mode of life, on the southern tributaries of the Smoky Hill in McPherson County, Kans., and on tributaries of the Arkansas River in central and southern Kansas. Site 14EW6, lying somewhat north and west of the previously known range of the complex, may be presumed to mark a periodic camp site, perhaps utilized by hunting or trading parties.

In Harlan County additional information on the nature of the Dismal River culture complex has been accumulated. Dismal River sites have been found so far mainly in the Sandhills and High Plains of western Nebraska, between the 99th and 104th meridians and southward from the Niobrara to the Smoky Hill Valley in Kansas. At Harlan County, as in previous work on Stinking Water Creek in Chase County, Nebr., house patterns differing rather widely from those of the earlier Upper Republican peoples, and suggesting a less substantial type of dwelling, were uncovered. To date, in this locality, no satisfactory evidence of horticulture, of contact with Whites, or of trade relations with southwestern peoples, has been found. Most of the artifacts correspond nicely to those found previously at other Dismal River sites in southern Nebraska and in western Kansas, and there can be no question as to the cultural relationships of the materials here. Ethnohistorical considerations leave little room for doubt that the Dismal River remains, which elsewhere have been found in such context as to indicate a late seventeenth and early eighteenth century dating, are the remains of Plains Apache who were displaced southward about the middle of the eighteenth century by arrival of the Comanche from the west.

Because the year 1948 witnessed no extended excavations in any of the numerous village sites along the Missouri River in the Dakotas, there seems little point to adding further conjectures and guesses to the literature on the area. The surveys carried on have merely confirmed the extraordinary abundance and richness of aboriginal remains here; and preliminary sherd analyses have verified the views that regional and temporal differences occur. Unfortunately, it is not yet possible to translate the site-to-site or locality-to-locality differences now apparent into a clear story of cultural growth. It would not be surprising if something similar to the Woodland-Upper Republican-Lower Loup-Pawnee sequence in the Nebraska region were eventually demonstrated for the main stem in the Mandan and Arikara areas, but much more thoroughgoing studies and more comprehensive excavations than have been made in the past will be necessary to test this possibility. And, linked with this much-needed main-stem work, additional data must be gotten from the westerly tributaries of the Missouri before it becomes possible to tie in satisfactorily the pottery-bearing manifestations scattered westward to or beyond the Black Hills and the valleys of the Little Missouri and the Yellowstone.

From such widely scattered, often sketchy, and very uneven data as are now available concerning the archeological remains of the Missouri Basin, no detailed synthesis of culture growth and human development can yet be made. The broad outlines of human history in the region, however, are becoming increasingly clear. It seems evident that throughout a span of time very likely to be measured in terms of millennia, simple hunting and gathering peoples dominated much or most of the area. This occupation began at a time when large game animals of species that have since become extinct still roamed the western plains; and there is geological, paleontological, and other evidence that climatic and physiographic changes of appreciable magnitude have taken place during the period that has elapsed since. It may be assumed that the population groups during this stage were small and scattered, and that most of the energies of the peoples were devoted to the getting of food, shelter, and clothing. Since most known sites are situated in or on stream terraces and in otherwise unprotected places, little is left of the material culture of the original occupants save items made of relatively durable materials. The extent and nature of work in skin, basketry, wood, and other perishable media is mostly unknown, as is the physical appearance of the people themselves. No positive evidence of the domestic dog has been found in association with the Folsom, the so-called Yuma, or the later prehistoric hunting and gathering complexes of the Missouri Basin region.

In the semiarid sagebrush plains of central Wyoming, there is reason to believe that a late prehistoric occupation by a small-game hunting and gathering people, who were possibly Shoshonean, took place. Further work at such reservoir localities as Edgemont, Keyhole, Moorehead, and Angostura ought to show how far eastward this incursion of Great Basin peoples and economies extended. Elsewhere in the short-grass plains of Montana, Wyoming, and adjacent areas, a basic economy probably consisting of big-game hunting combined with gathering lasted into the historic period, when the mode of life was considerably altered and greatly enriched by acquisition of the horse in the late seventeenth and early eighteenth centuries.

In the eastern portion of the Missouri Basin, along the Missouri itself and in the valleys of its major tributaries as far upstream as the Yellowstone, primarily hunting and gathering economies gave way in prehistoric times to peoples who practiced food growing as well as food gathering. It is not yet certain at what time period or cultural level the use of domestic plants here began. A few kernels of maize have been reported from a Woodland site in central Nebraska; but the few Woodland sites where comprehensive excavations have been carried on have yielded no evidence of horticulture, except possibly in the case of the Sterns Creek complex in eastern Nebraska. It is possible that thoroughgoing investigations at other sites attributed to the Woodland period, particularly in eastern Nebraska and in the Dakotas, will produce evidence of tillage or of domestic crops. Settlements of the Woodland peoples were small and unfortified; habitations were of perishable materials and apparently of light construction; and except for the presence of limited amounts of pottery in the western Woodland sites, there is little or nothing to suggest that the mode of life followed differed very markedly from that of the late preceramic hunters of the plains. At best, it would seem that incipient horticulture may be suspected for the Woodland peoples whose remains have so far been studied in the Missouri Basin west of the main stem.

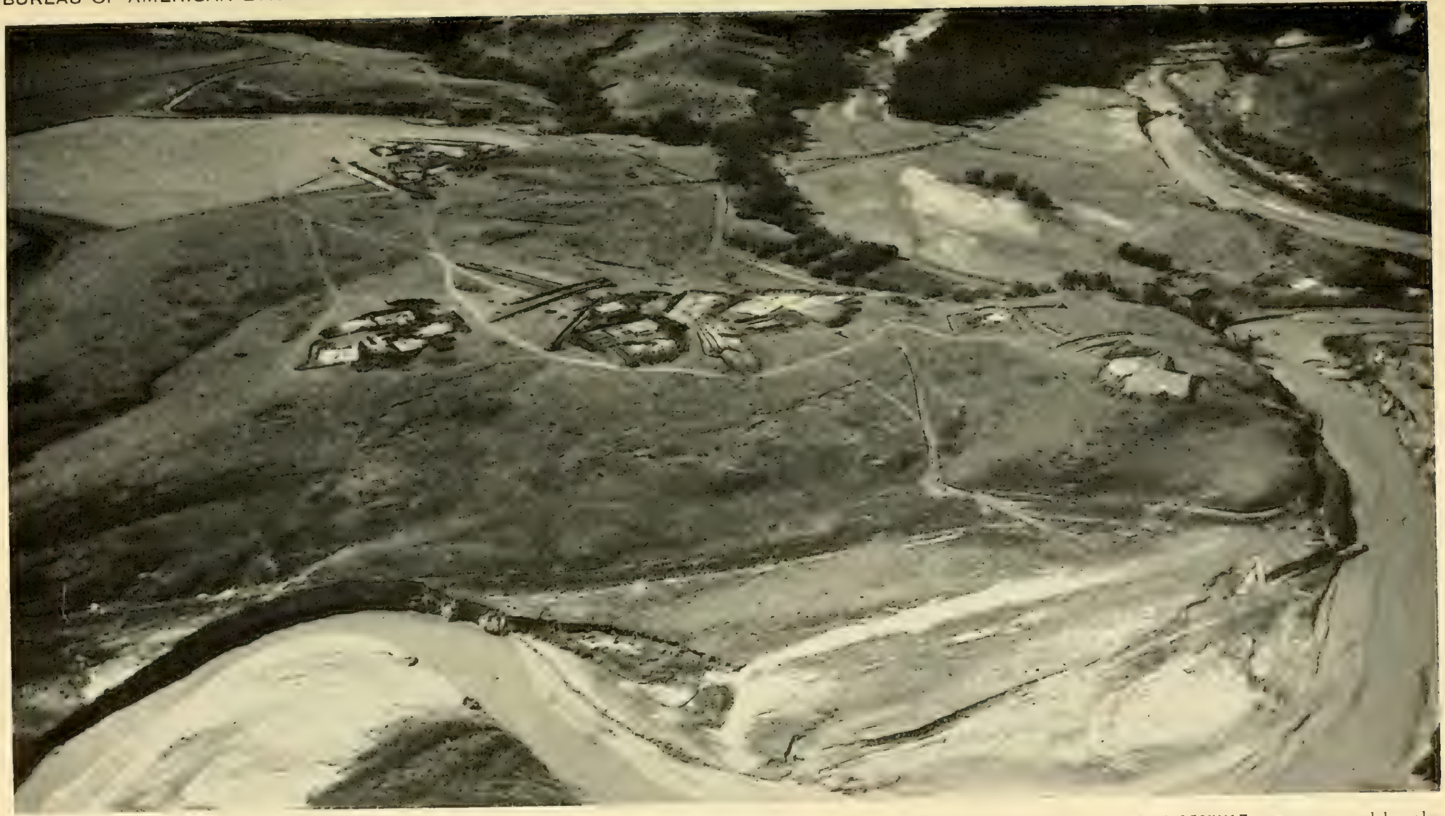
Following the widespread and as yet ill-defined Woodland occupancy of the trans-Missouri plains, with its doubtful or incipient horticulture, came another of markedly dissimilar character. This one, provisionally dated to the thirteenth, fourteenth, and fifteenth centuries, is represented by numerous village sites assigned to the Upper Republican and related complexes. Maize, beans, squash, and sunflowers were cultivated; hunting and the gathering of wild plant foods were secondary subsistence sources; and fishing, including in some localities the extensive collecting of freshwater mussels, was also practiced. The people resided in small, relatively permanent, unfortified communities of rectangular earth-covered lodges; and the clustered arrangement of habitations in at least some instances suggests that kin groups may have been the basis of society. No satisfactory evidence of community ceremonial centers has yet been adduced for these settlements. Pottery was much more abundant and better made than that of the preceding Woodland peoples; and there were fairly well-developed and varied industries in stone, bone, horn, and shell. This prehistoric small-town stage is abundantly represented in the drainage basins of the Kansas-Smoky Hill-Republican and the Platte-Loup systems. There are some suggestions of a counterpart along the Missouri in the Dakotas; but its existence there, and its contemporaneity, if it exists, with the Central plains materials, remain to be demonstrated.

In central Kansas and in east-central Nebraska, the small-town Upper Republican communities were apparently superseded in the late fifteenth and sixteenth centuries by larger aggregations of semisedentary peoples who practised an intensive maize-bean-squash horticulture, together with some hunting and gathering, and dwelt in villages of circular grass houses or, north of the Kansas River drainage, of circular earth lodges. Considerable crop surpluses are suggested by great numbers of large storage pits in the village sites; and it may be presumed that these horticulturists traded some of their surplus to contemporary hunting peoples ranging the plains to the west. Somewhat later in time were the archeological manifestations termed Dismal River, and several vaguely defined and unnamed pottery-making complexes found from the Kansas River to the Niobrara and probably beyond. Regionally distinctive complexes, of which there is evidence in the preceding small-town stage, are increasingly apparent; and there is also indication of more extensive trade contacts than can be demonstrated for the prehistoric period. These various archeological complexes, moreover, were late enough in point of time so that in several instances more or less satisfactory correlations can be made with historic tribes of the region, such as the Wichita, Pawnee, and Plains Apache.

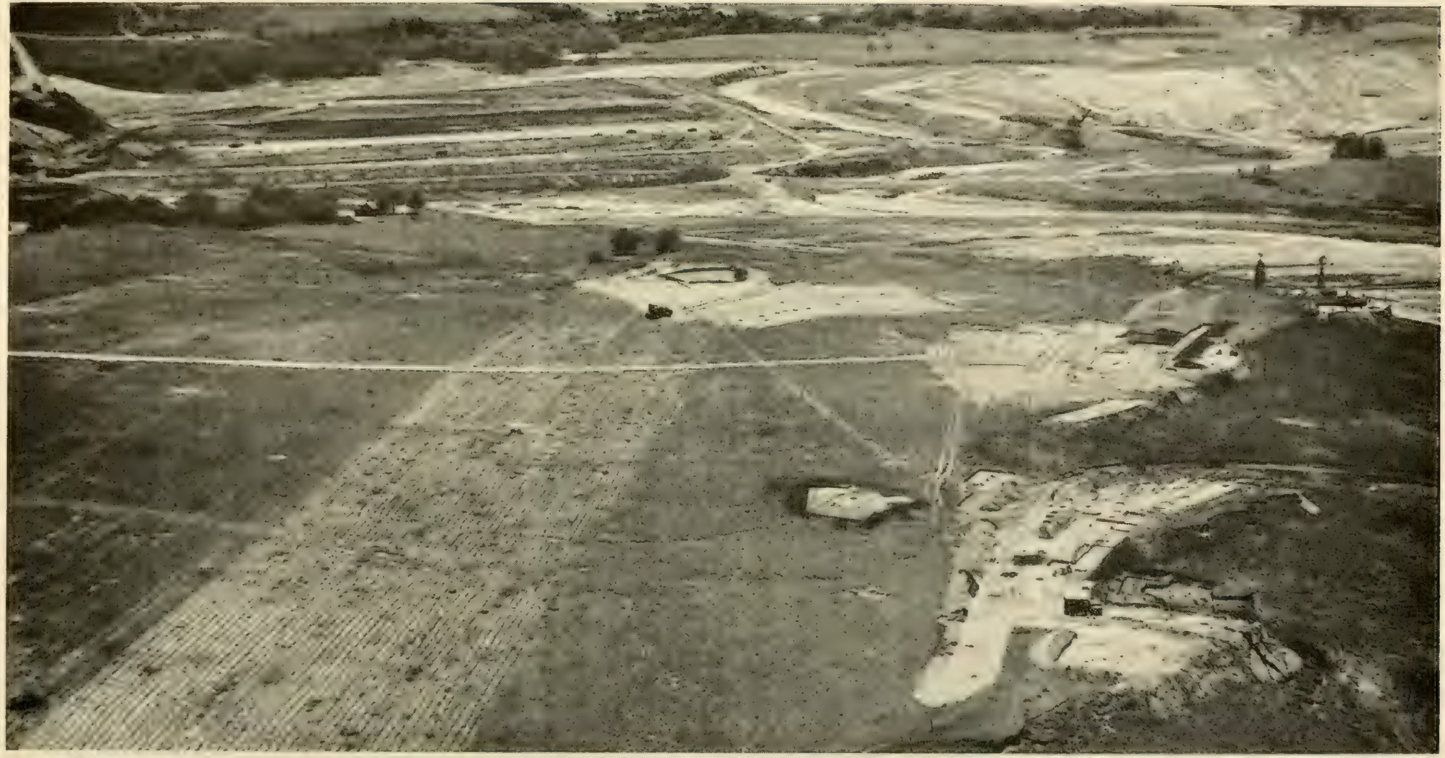
In the Central Plains, compactly built and fortified towns seem to have developed after the close of the small-town period and after the gathering of people into larger communities was well under way. A similar tendency toward defensive measures is indicated on the upper Missouri. Among the longer established and more strongly horticultural village tribes of the eastern Missouri Basin, such as the Pawnee, Arikara, and Mandan, this period immediately before, during, and after the first contacts between the Indians and Europeans seems to have been the high-water mark of native cultural achievement in the Missouri Valley. Following it, as historical and archeological data clearly show, came the swift rise to ascendancy of the horse-using bison hunters of the western plains and the parallel decline in influence of the older village cultures.

In the broad view, it is obvious that hunters and primitive horticulturists flourished for a long time in the Missouri River Basin, before as well as after the coming of the white man. It is also clear that the archeological complexes representing these aboriginal occupancies, though relatively simple, varied considerably from locality to locality and from one time period to another. Here and there the various complexes have been aligned in what are very probably correct chronological and developmental sequences. There still exist, however, enormous gaps in our information. In the western portions of the Basin, including Montana, Wyoming, and adjacent areas, numerous sites have been located but very few have been systematically and comprehensively excavated. Along the Missouri River in the Dakotas, hundreds of village sites representing several centuries of residence by various tribes, likewise remain very inadequately known. Throughout the whole Basin, there are growing indications that man's successive occupancies may correlate with climatic fluctuations whose records can be studied in stream terraces, buried soil horizons, wind and water deposits, and other physiographic and geologic phenomena. There are excellent prospects, I think, that as archeologists expand and bring into sharper focus the story of native man's residence in the Basin they will be able to contribute information of importance to students of the various earth sciences. This, of course, is not the primary goal of archeological research, any more than is the mere accumulation of great numbers of specimens; but it promises to be an important byproduct of our investigations.

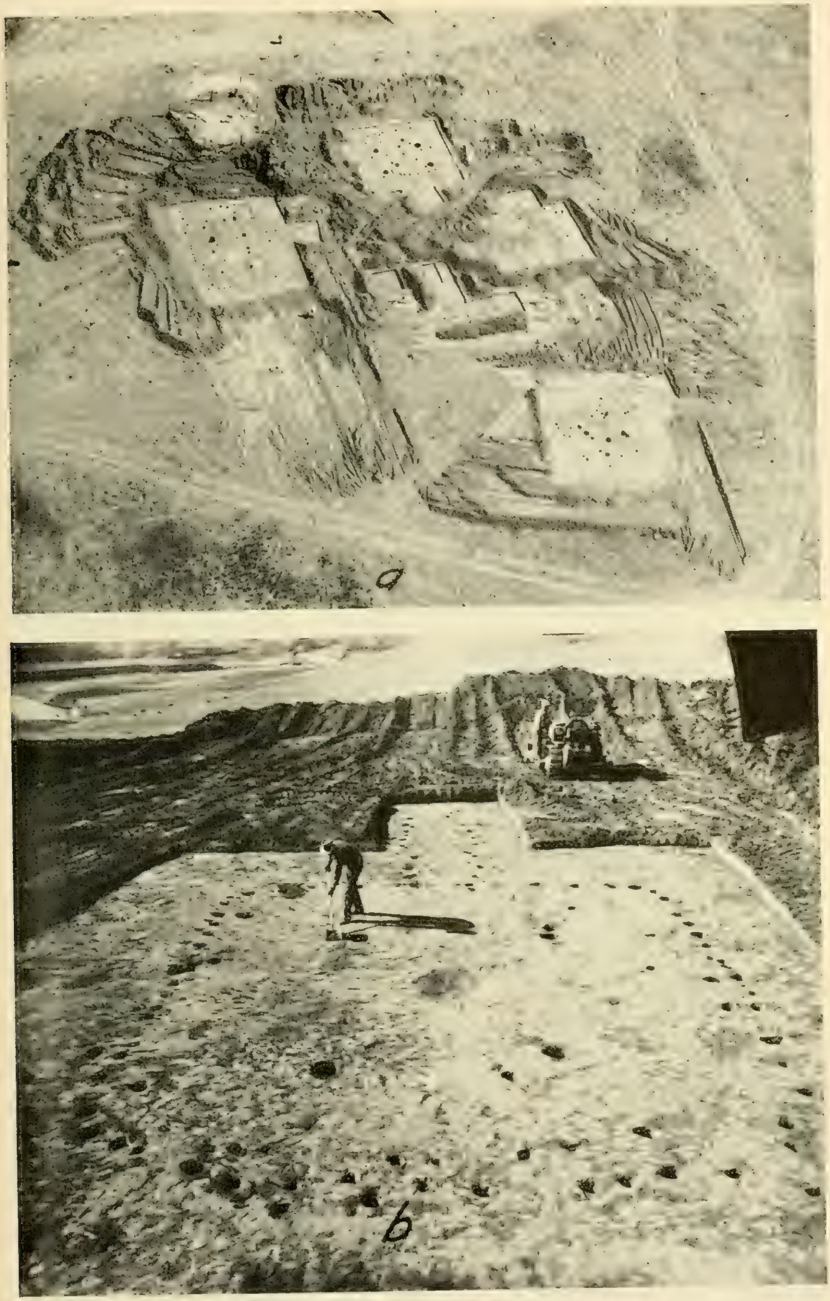
As the Federal water-control program in the Missouri Basin speeds up and expands, the need for an equally accelerated scientific recovery program is also accentuated. As dam after dam reaches completion, increasing numbers of archeological sites will disappear beneath the rising reservoir waters. In many instances, as particularly along the Missouri River in the Dakotas, the remains that will be destroyed cannot be duplicated outside the reservoir areas. Unless these unique and irreplaceable segments of native American history are to be irretrievably lost, funds for their study and partial salvage must be made available promptly and in adequate amount. The time remaining for this task is fast running out.



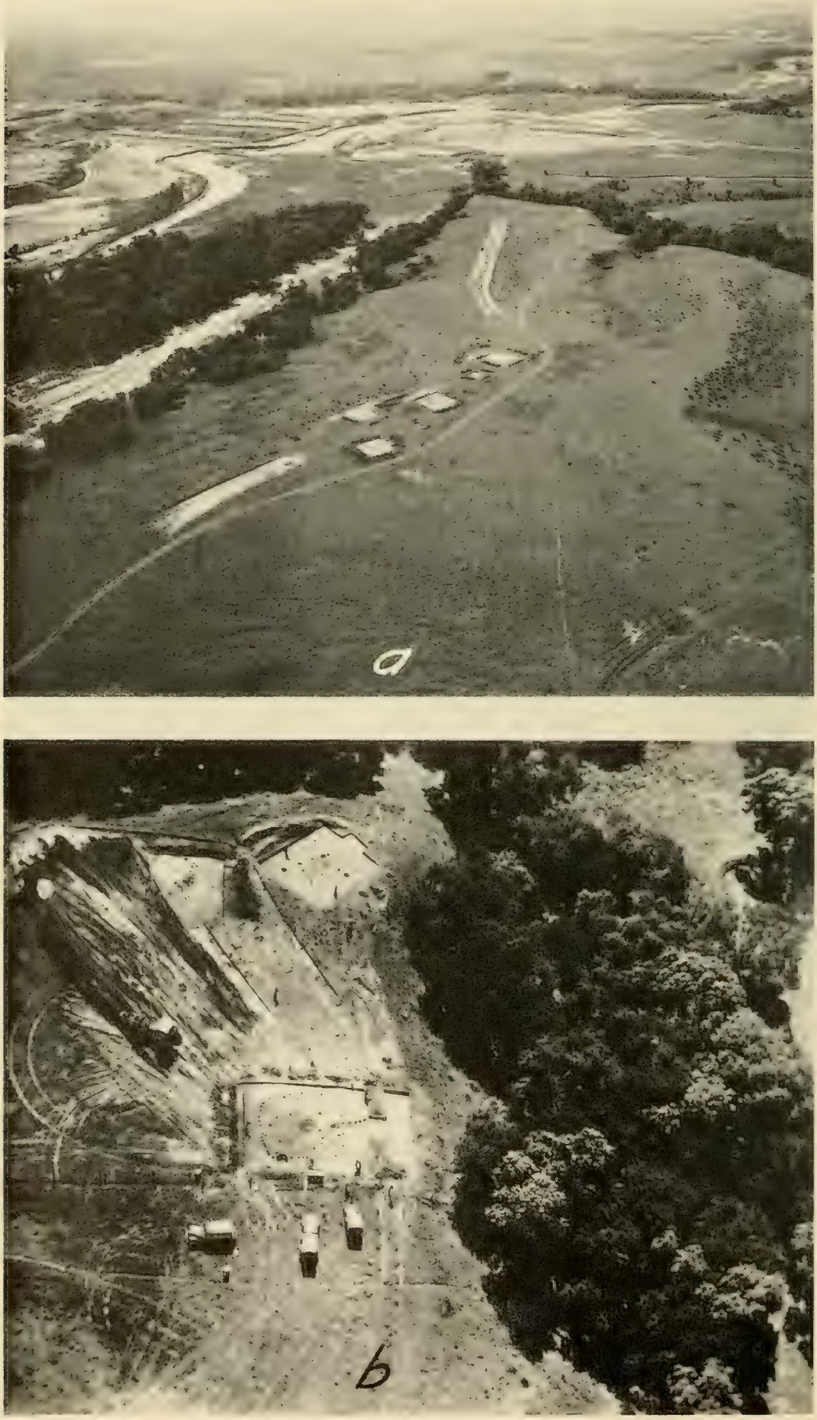
Aerial view of Medicine Creek Dam site, looking upstream; River Basin Surveys excavations shown are at Sites 25FT16 and 25FT17, now covered by the dam fill. (Bureau of Reclamation Neg. 404-1010G.)



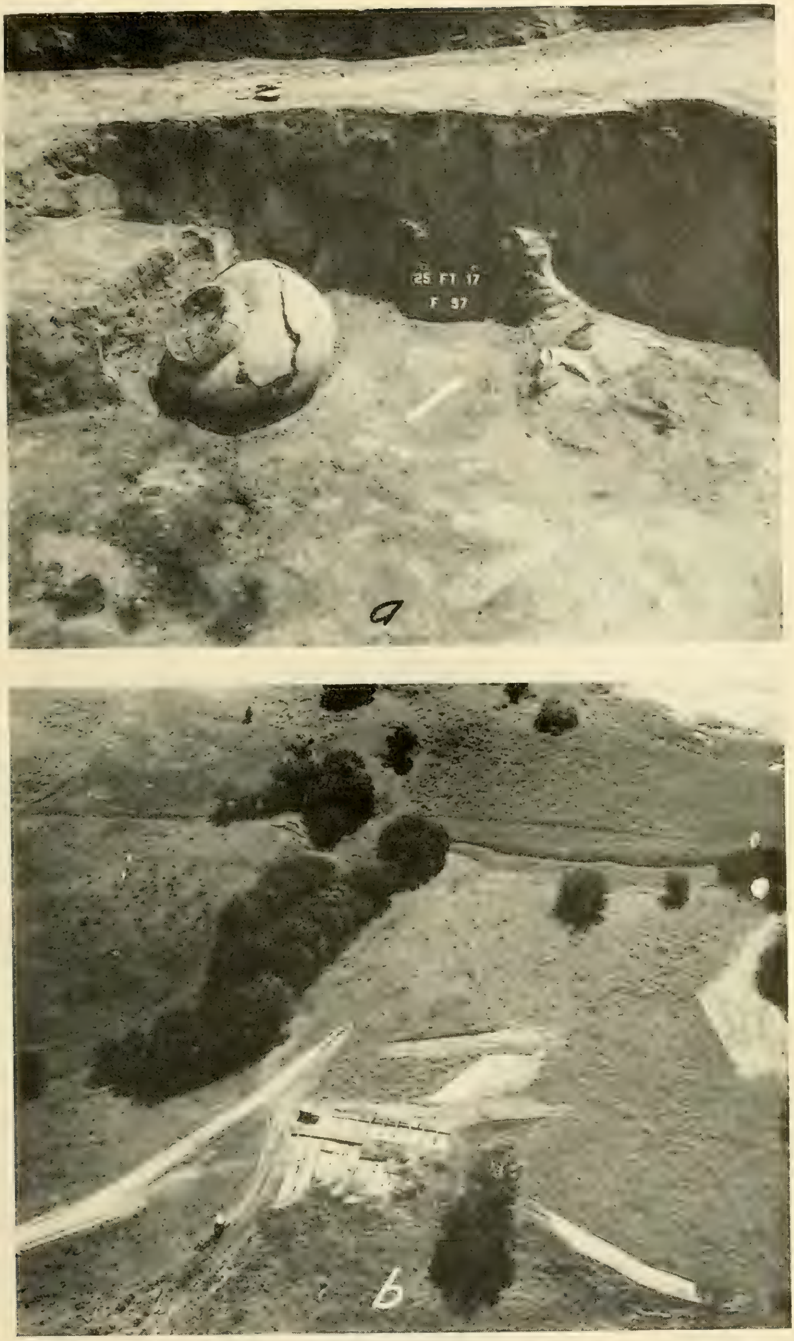
Aerial view of Medicine Creek Dam site (construction area at top), looking downstream. The River Basin Surveys excavations shown at Site 25FT13 (right and top center) have since been destroyed by earth borrowing for the dam fill. (Bureau of Reclamation Neg. 404-1010H.)



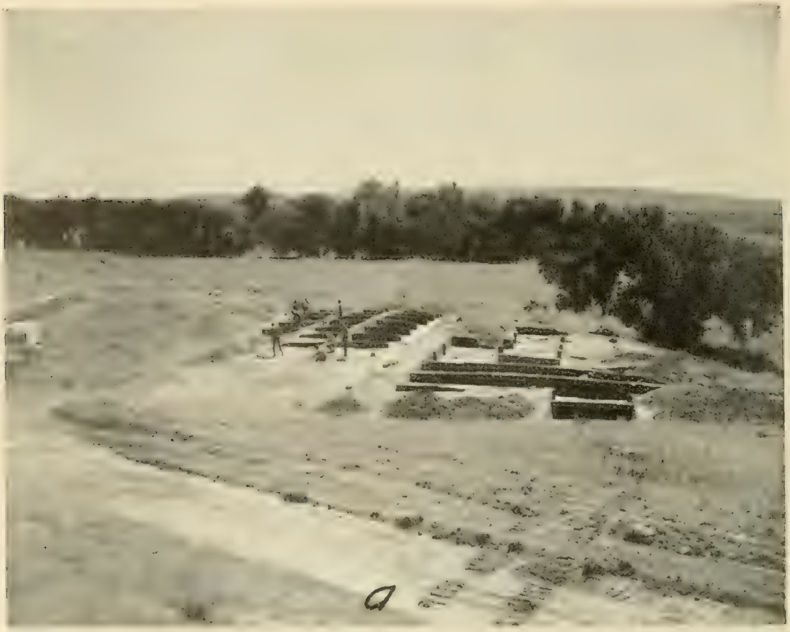
a, Aerial view of excavations at 25FT17, Medicine Creek, Nebr. Three prehistoric house sites and associated refuse areas shown here are now covered by the Medicine Creek Dam. (Neg. 25FT17-124.) *b*, Excavating a prehistoric house site at 25FT17, Medicine Creek, Nebr. Note central fireplace basin surrounded by four large primary and numerous smaller secondary post molds, with vestibule entryway opening to south. (Neg. 25FT17–111.)

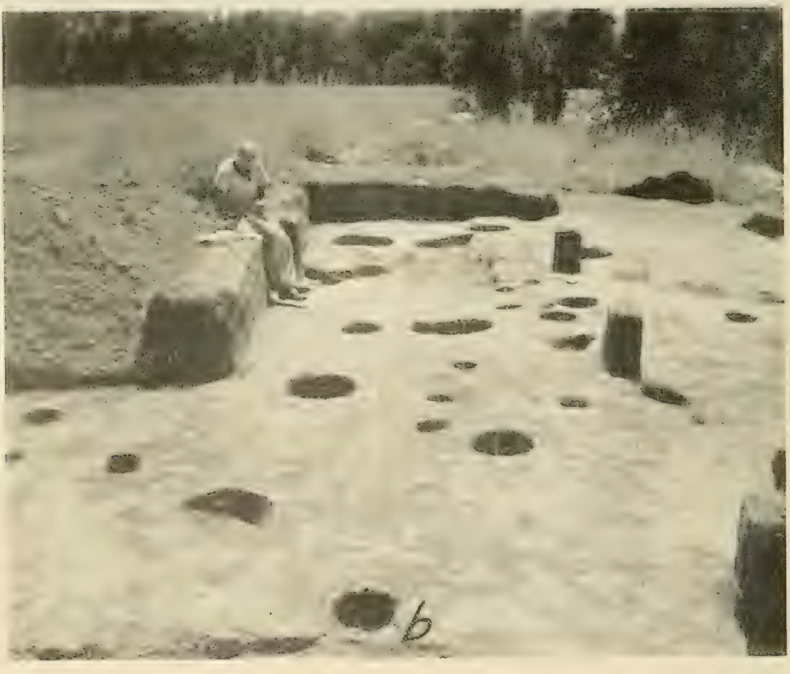


a, View southeast across excavations at 25FT70, Medicine Creek, Nebr. Square excavations at center have exposed four house sites; dam under construction at top and left center. (Neg. 25FT00–45.) *b*, Prehistoric house sites and other features uncovered at 25FT70, Medicine Creek, Nebr. (Neg. 25FT70–11.)

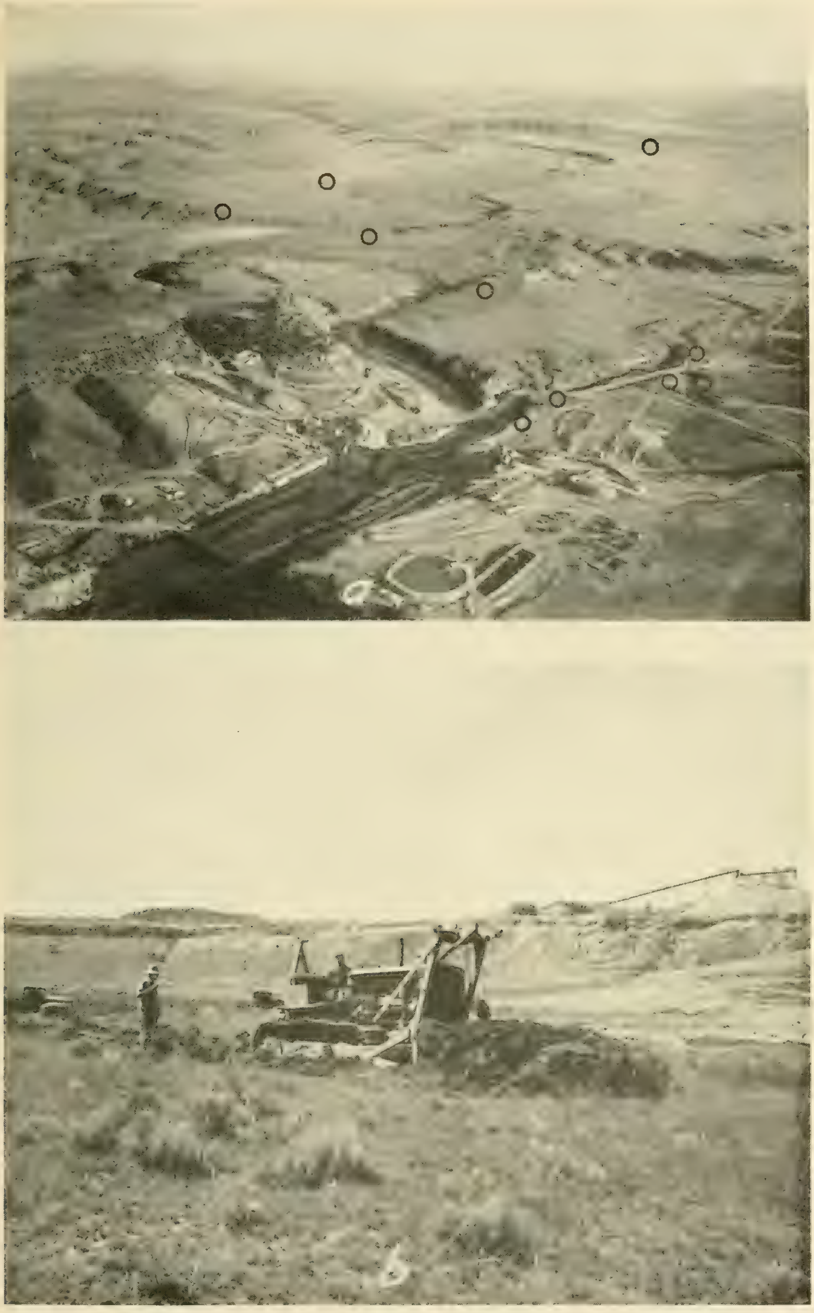


a, Pottery vessels as uncovered on floor of prehistoric earth-lodge site at 25FT17, Medicine Creek, Nebr. Upright charred timbers at rear mark approximate wall of house pit. (Neg. 25FT17–147.) *b*, Excavations at Woodland site 25FT18, at junction of Lime and Medicine Creeks, Nebr. (Neg. 25FT18–48.)

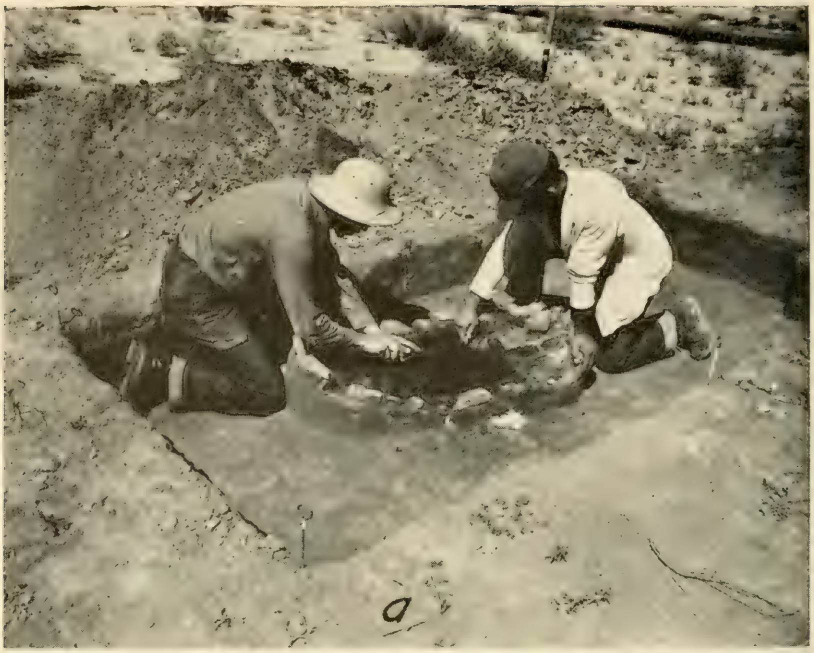


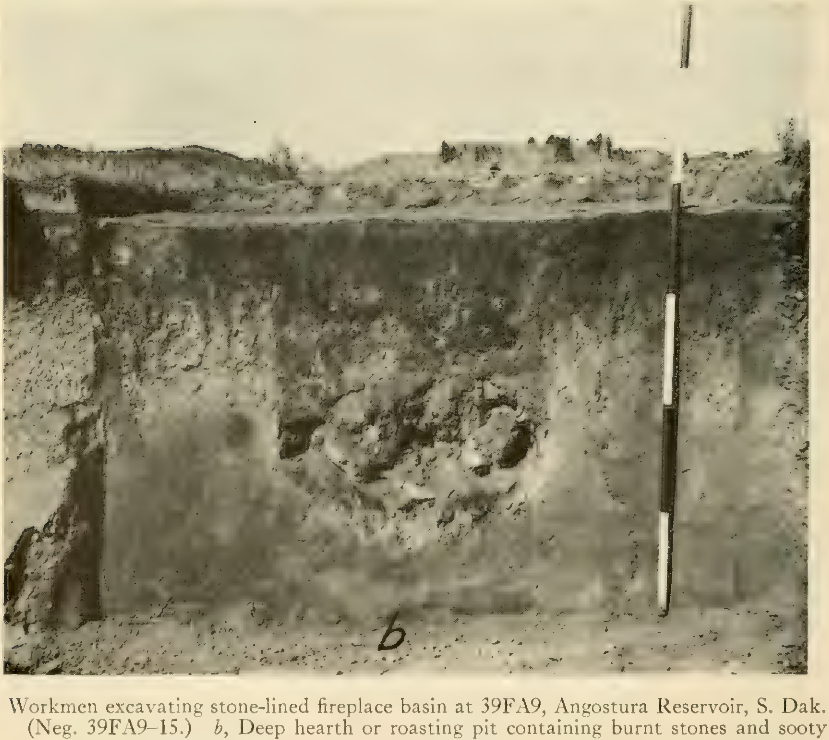


a, View south across excavations at 25FT18, Medicine Creek, Nebr. Control strips or blocks have been left standing at 10-foot intervals to show nature of culture zone and overlying deposits. (Neg. 25FT18–22.) *b*, Fireplaces, post molds, and miscellaneous small pits at base of Woodland occupation zone, Medicine Creek, Nebr. (Neg. 25FT18-16.)

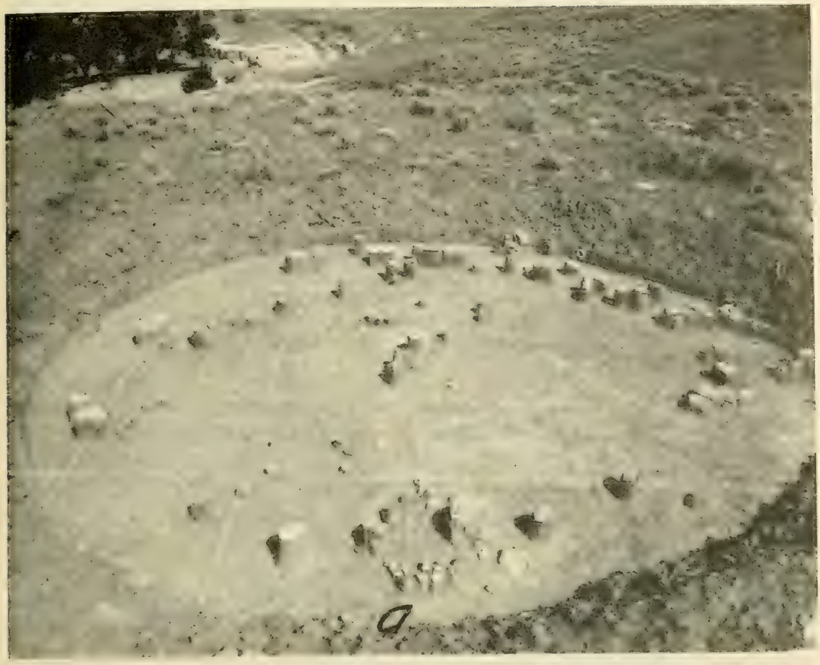


a, Aerial view of Angostura Dam (center foreground) and part of reservoir area beyond, Angostura Reservoir, S. Dak. Circles indicate some of the archeological sites within the future pool area. (Neg. 39FA00–20.) *b*, Bulldozer of Utah Construction Company removing sod at start of archeological tests at 39FA10, Angostura Reservoir, S. Dak. Part of construction area visible in background. (Neg. 39FA10–2.)

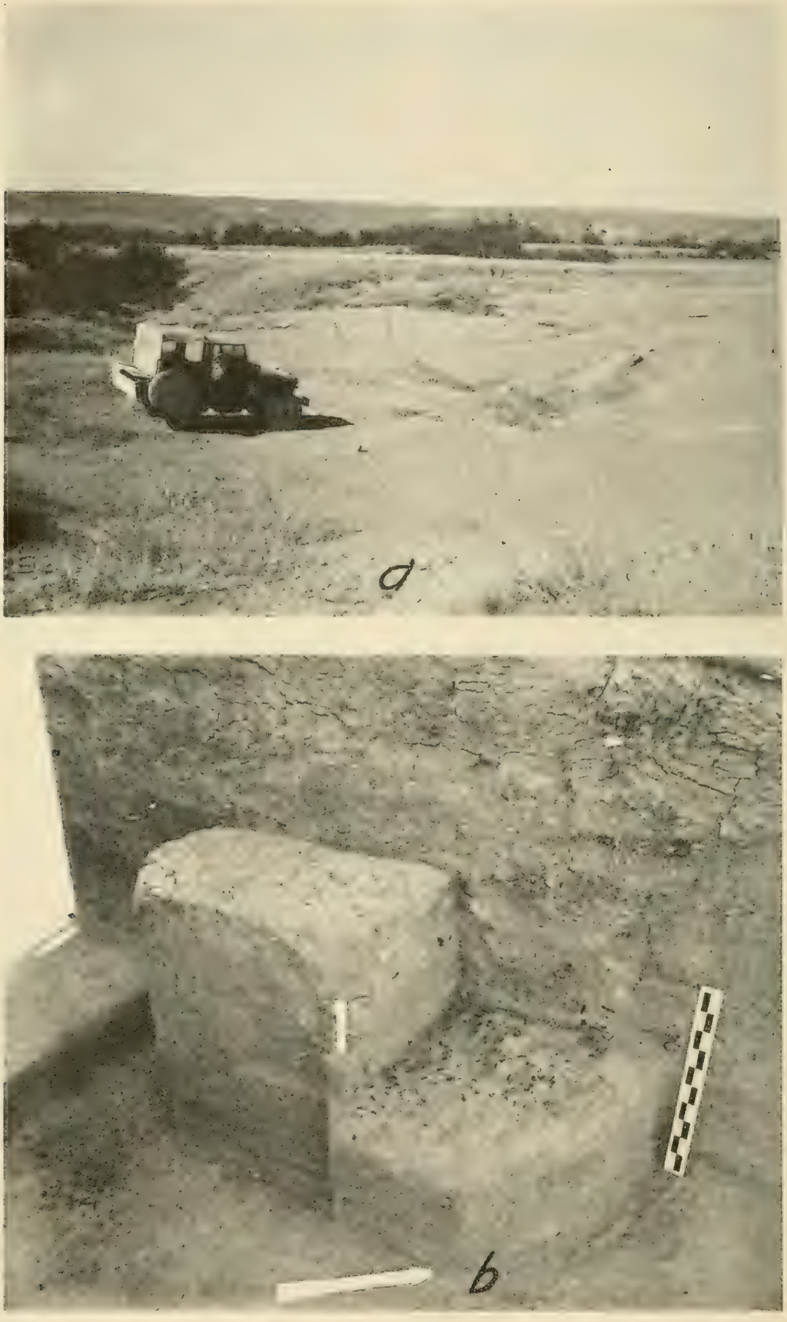




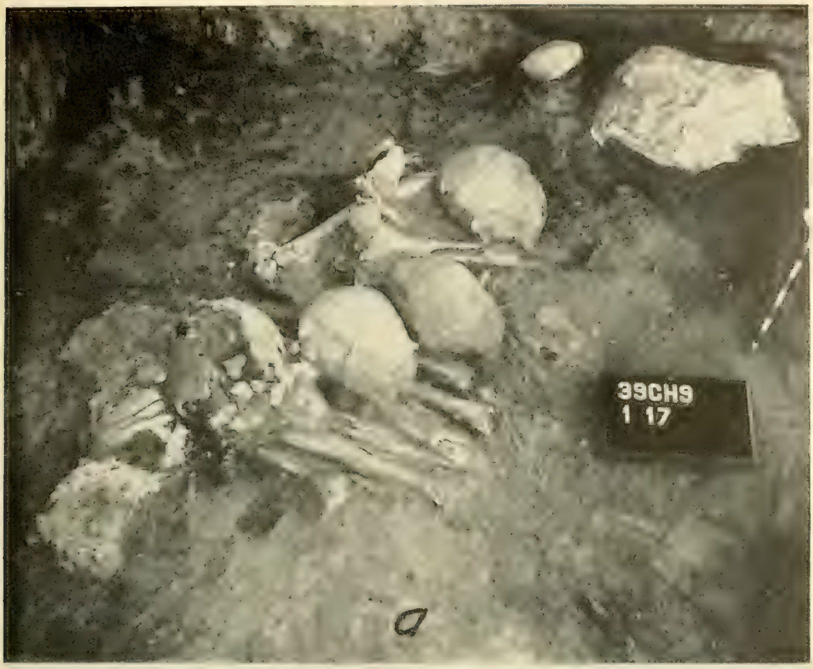
a, Workmen excavating stone-lined fireplace basin at 39FA9, Angostura Reservoir, S. Dak. (Neg. 39FA9–15.) *b*, Deep hearth or roasting pit containing burnt stones and sooty soil, exposed during road construction; Angostura Reservoir, S. Dak. (Neg. 39FA68–2.)

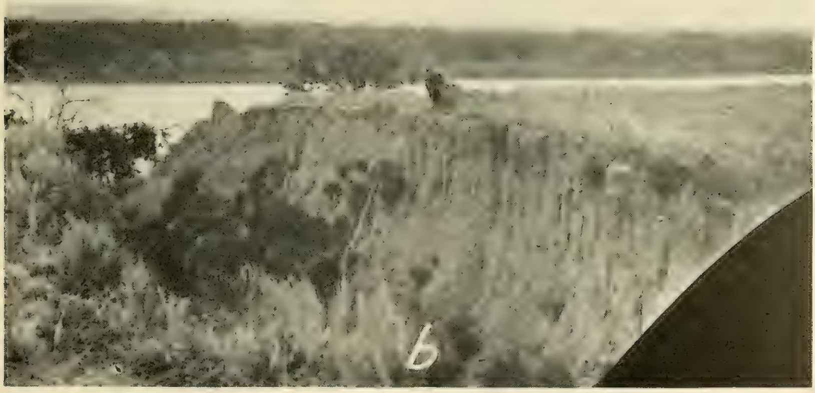


a, Excavated tipi ring at 39FA13, Angostura Reservoir, S. Dak. Stones marking tipi ring are underlain in center foreground by an older rock-filled hearth consisting in part of broken manos and grinding slabs. (Neg. 39A13–3.) *b*, Refuse beside aboriginal quartzite quarry pits on Flint Hill, 39FA49, near head of Angostura Reservoir, S. Dak. (Neg. 39FA49–12.)

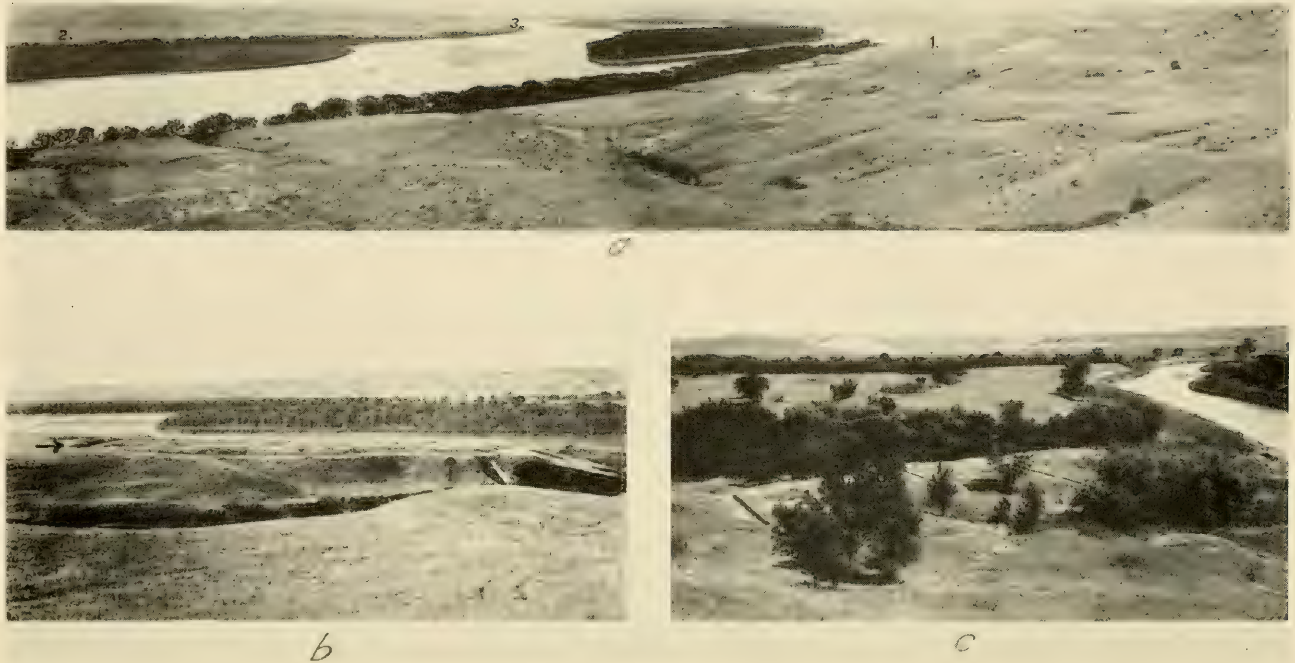


a, View west across Area A at the Long site, 39FA65, Angostura Reservoir, S. Dak. Test cuts are visible to right of center; Horsehead Creek in background. (Neg. 39FA65–10.)
b, Excavations at Long site, 39FA65, Area A, Angostura Reservoir, S. Dak. Beside and just above the charcoal-laden zone was found the basal fragment of an obliquely flaked point, here shown in situ (small arrow). (Neg. 39FA65–11.)





a, Grouped secondary burials as found in Mound 39CH9, formerly situated in spillway line of Fort Randall Dam, Charles Mix County, S. Dak. (Neg. 39CH9–32.) *b*, Buried archeological zone (line of white stones and bone) exposed in wall of ravine cutting into Missouri River terrace at 39ST23, about 3 miles below Cheyenne River, Oahe Reservoir area, Stanley County, S. Dak. (Neg. 39ST23–1.)



a, Panorama of Oahe Dam site, about 6 miles above Pierre, S. Dak., looking northwest up the Missouri River. Site 39HU22, on the east bank at *1*, lies directly on the axis of the proposed dam; 39ST14 (Scotty Phillips Ranch site) at *2*, and 39ST6 (Buffalo Pasture) at *3*, will be respectively downstream and upstream from the dam. (Neg. 39HU00-6 and 7.) *b*, Buffalo Pasture site, 39ST6, showing fortification ditch (arrows); Oahe Reservoir site, S. Dak. *c*, Site 32GT1, on Heart River, showing exploratory trenches; Heart Butte

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River Basin Surveys Papers, No. 2

Prehistory and the Missouri Valley Development Program
Summary Report on the Missouri River Basin Archeological Survey in 1949

By WALDO R. WEDEL

CONTENTS

PAGE
Introduction 65
  Personnel 67
Laboratory activities 68
Field work and explorations 70
  North Dakota 71
  South Dakota 74
  Wyoming and Montana 84
Field work by cooperating agencies 87
  Kansas 88
  Montana 90
  Nebraska 91
  North Dakota 96
Conclusions 97

ILLUSTRATIONS

PLATES

13. *a*, Site 39FA10, Trench B, showing archeological remains at various levels; Angostura Dam in background. Fall River County, S. Dak. *b*, East test trench at site 39FA30, on Horsehead Creek, Angostura Reservoir, Fall River County, S. Dak. 102
14. *a*, Site 24PR2 at edge of sandstone cliff (foreground); looking southeast toward Powder River and Bitter Creek. Moorhead Reservoir, Montana-Wyoming. *b*, Site 39PE10 (on knoll in foreground), looking west up Moreau River Valley. Bixby Reservoir site, Perkins County, S. Dak. 102
15. *a*, Chimney Butte from Manderson-Rockyford Road, with low terrace and site 39SH1 (arrow) in middle distance. Rockyford Reservoir site, Shannon County, S. Dak. *b*, Site 39ST14 (Scotty Phillips Ranch), a fortified Arikara village site in the work area just below Oahe Dam; Stanley County, S. Dak. 102

PREHISTORY AND THE MISSOURI VALLEY DEVELOPMENT PROGRAM

SUMMARY REPORT ON THE MISSOURI RIVER BASIN ARCHEOLOGICAL SURVEY IN 1949

By WALDO R. WEDEL

INTRODUCTION

Continuing its studies of the archeological and paleontological materials that will be adversely affected by the expanding Federal water-control program in the Missouri River watershed, the Missouri River Basin Survey carried on its field and laboratory activities throughout calendar year 1949. For various reasons the year was an unusually trying one, even frustrating in some respects; but within the limit of available funds and in the face of a rapidly changing personnel picture, a measure of progress nevertheless can be recorded.

The Missouri River Basin Survey, now in its fourth year of operation, was initiated in 1946. It is one regional phase of the nationwide River Basin Surveys, directed by Dr. Frank H. H. Roberts, Jr., Bureau of American Ethnology, for the Smithsonian Institution, and is supported by funds transferred by the Bureau of Reclamation through the National Park Service. The nature of the interbureau agreements which form the basis for all these investigations, and also the general background, organization, and objectives of the Missouri River Basin Survey, have been detailed in other papers.[1] In briefest outline, the purpose of the Surveys program is to locate, systematically record, and appraise the archeological and paleontological materials that will be lost as a result of the Federal water-control projects planned or under construction by the Bureau of Reclamation, Department of the Interior, and the Corps of Engineers, Department of the Army; to pass on this information to the National Park Service; to make recommendations, where needed, as to the steps required to insure recovery of a minimum representative sample of the scientific information that would otherwise be lost; and to direct the Federal phases of such subsequent detailed recovery work as may be provided for, including limited or comprehensive excavations at key sites.

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[1] See Smithsonian Misc. Coll., vol. 107, No. 6, April 23, 1947; Amer. Antiq., vol. 12, No. 4, pp. 209–225, April 1947; and the annual reports of the Bureau of American Ethnology for 1945–46, 1946–47, 1947–48, 1948–49.

The present report, fourth in a continuing series, briefly reviews the field and laboratory operations in archeology and paleontology by the Missouri River Basin Survey during calendar year 1949. Like the annual summaries which have preceded it this one is in no sense a complete and final report of accomplishments. Rather it represents a statement of progress made during the period indicated; and any interpretations advanced are subject to revision in the light of more penetrating analyses by the staff members and others on whose industry the present report is largely based. Also included are brief summaries concerning the work of several States agencies cooperating actively in the recovery of materials which might otherwise be lost.

As in previous years, the Missouri River Basin Survey is indebted to various organizations, agencies, and individuals for assistance of many kinds. Among the Federal agencies with which the Survey was in particularly close contact, mention should be made especially of various officials in the National Park Service, notably in the Chief Historian's Office in Washington, and in the Missouri River Basin Recreation Survey Office, Region 2, Omaha; the Bureau of Reclamation, including its regional and various field offices; and the district and field offices of the Corps of Engineers. Among State and other non-Federal agencies, the continued readiness of officials of the University of Nebraska and its Laboratory of Anthropology to furnish space at a nominal fee for the Survey offices and laboratory was an especially appreciated courtesy. Survey field parties, as well as the Lincoln office, were the recipients of innumerable courtesies and services from numerous project engineers, representatives and employees of construction companies, and private individuals, to all of whom, though they go nameless here, sincere thanks are due. Last but by no means least, the continued efforts and unflagging interest of the Committee for Recovery of Archeological Remains, which represents the archeological profession of the Nation and various learned societies, must be gratefully acknowledged.

I have indicated that the year 1949 was a particularly trying one. There were several reasons for this. First and foremost was the question of funds. Reduced allotments by the National Park Service for fiscal year 1949, which included the first half of calendar year 1949, and mandatory salary increases for which no supplementary funds were granted, meant that the working funds actually available were nearly 30 percent below those for the preceding year, from which there had been virtually no carry-over. The prospect of little or no carry-over at the end of fiscal year 1949 meant that field plans for the summer of 1949, which included proposals for excavation of selected sites in Fort Randall, Garrison, Oahe, Tiber, Mullen, Yellowtail, Harlan County, and Baldhill Reservoir areas, plus preliminary surveys elsewhere, could not be set in motion because of uncertainty concerning congressional action on the appropriations bill on which the plans depended. By the time appropriations for fiscal year 1950 (July 1, 1949 to June 30, 1950) were clear, the 1949 summer field season was virtually over and it was impossible to organize any large-scale excavation projects. The Missouri River Basin Survey was able to conduct limited field investigations in 1949 only because of transfer of special funds, earmarked for specific purposes, by the Bureau of Reclamation and the National Park Service. One of the few bright spots in the 1949 picture was the fact that the increased fiscal year 1950 funds, which finally became available in September 1949, will perhaps ease the way toward planning and implementing of a large-scale excavation and survey program in calendar year 1950.

Also complicating the Survey operations was a rather heavy personnel turn-over, particularly among professional staff members. Owing in part to the straitened financial condition of the organization, i. e., reduced allotments in the face of increased operating expenses, two archeologists were separated from the project early in 1949. Two others resigned, one in May and one in September. Thus, to the immobilizing of professionals who should have been in the field was added the loss of others who would have been preparing reports on the work that had been accomplished previously. Aside from the resulting inevitable increase in backlog of unreported data and materials, the effects on morale of remaining project personnel of all this uncertainty regarding the future of the program can perhaps be imagined. There is scant consolation, of course, in the realization that other phases of the River Basin Surveys program were struggling under the same, or similar, handicaps and uncertainties.

PERSONNEL

Several changes took place in the professional staff of the Missouri River Basin Survey during 1949. Owing to a reduction in the funds available for fiscal year 1949 as compared with the allotment for the preceding year and to increased operating expenses for the project, it became necessary to reduce the staff soon after close of the calendar year 1948. Early in January, Wesley L. Bliss, archeologist, was released, and J. Joe Bauxar, archeologist, was transferred to Oklahoma. In May, Marvin F. Kivett, archeologist, resigned to accept the position of Museum Director at the Nebraska State Historical Society; and in the same month, through transfer of special funds for specific survey purposes, Richard P. Wheeler was assigned to the Lincoln office. In September, Jack T. Hughes resigned to return to school;

and in November the staff paleontologist, Dr. T. E. White, was temporarily transferred to another project. At year's end, the professional staff included three full-time archeologists: Paul L. Cooper; Robert B. Cumming, Jr., laboratory supervisor; and Mr. Wheeler.

Full-time laboratory and office personnel included Dean Clark and A. E. Nixon, laboratory assistants; J. M. Shippee, expert laborer; George Metcalf, field and laboratory assistant; and Mrs. Ina May Reagan, clerk-stenographer. Drafting was carried on throughout the year with part-time student assistance.

Several students were employed as members of field parties. Neil Isto, Newell, S. Dak., accompanied Mr. Wheeler on a survey trip during June and early July, and subsequently participated in excavations at Angostura under Mr. Hughes. Also at Angostura as student helpers were Glenn Kleinsasser, Freeman, S. Dak.; and Donald K. Barnes, University of Missouri.

LABORATORY ACTIVITIES

The field headquarters, staff offices, and laboratory of the Missouri River Basin Survey were located throughout the year in the Laboratory of Anthropology of the University of Nebraska. In anticipation of a marked expansion of Survey activities in the near future, negotiations were under way at year's end for additional laboratory, processing, and storage space at the Lincoln Air Base. As in the preceding year, storage space for field equipment and garaging for the Survey's vehicles were maintained at the Base.

In the laboratory, the basic project files, including site survey records, artifact and photograph files, and other relevant data, were maintained and expanded. Reserve files containing duplicate records of all material in the basic site files were also maintained.

The reference map file, including topographic, geologic, land survey, ownership and other types of maps frequently needed for planning or other purposes, was expanded by 218 additional sheets during the year. It now totals approximately 985 maps.

Drafting and map-making by the Survey have gone ahead steadily; as in previous years, this was done largely with part-time student help. Completed during 1949 were 20 profile sections and house floor plans for sites excavated in 1948 at Medicine Creek Reservoir, Nebraska; site location maps for 10 reservoir areas, including Bixby, Boysen, Cannonball, Davis Creek, Edgemont, Harlan County, Mullen, Onion Flat, Oahe, and Pomme de Terre; nine maps of sites in Angostura Reservoir area; and one general map of the Missouri Basin showing reservoir sites investigated for archeological and paleontological remains to the end of calendar year 1948.

In the darkroom 646 negatives were processed, including many returned from field parties and others made in the laboratory. These latter included upwards of 50 plates of selected typical artifacts from Medicine Creek and Angostura Reservoirs, many of which are intended for illustrative purposes in forthcoming publications. Black-and-white prints made during the year numbered 1,392, in addition to 72 enlargements for publicity and other related purposes. Transparencies processed numbered 146, most of them colored. A considerable portion of the time of the darkroom assistant was given over to the reflex copying of field records; about 2,000 sheets were made up by this method and added in the appropriate location to the project files.

The relatively limited amount of field work in which Survey personnel was engaged during the year, and the survey nature of much of what was undertaken, resulted in an appreciably smaller than usual flow of specimens from the field to the laboratory. A total of 15,857 specimens was processed, i. e., cleaned, cataloged, and stored, during the year. The restoration and repair of outstanding or representative pieces was carried on to a limited extent, including the restoration of 16 pottery vessels from Medicine Creek and of one from Oahe Reservoir. The bead-laden skeleton of an adolescent from the Woodruff Ossuary (site 14PH4) in Harlan County Reservoir was mounted for display, and has been placed temporarily on exhibit in the museum of the Nebraska State Historical Society in the State capitol in Lincoln.

As in previous years, the laboratory sent out for expert examination and report the animal bone, shells, and vegetal material shipped in at various times by field parties. From the identified material returned to Lincoln, a comparative collection of Missouri Basin molluscan shells and animal bone has been started, in the hope of facilitating future tasks of preliminary identification. A similar series of human skeletal remains for preliminary comparative work is also being started. It is gratifying to note that the accumulating collections of documented animal bone from various archeological periods and localities throughout the Missouri River Basin promise to contribute significant data toward elucidation of several specific problems, including, for example, such matters as the evolution of the domestic dog, changing faunal assemblages and varieties throughout time and space, and the varied utilization of native fauna by Indian groups at various periods of time.

With regard to publication and dissemination otherwise of information gathered in course of field and laboratory studies, the Missouri River Basin Survey has continued to furnish the National Park

Service with mimeographed appraisals of the archeological and paleontological resources of reservoirs investigated. During calendar year 1949, three preliminary statements on reservoirs not previously reported were distributed; and two supplementary statements containing revised appraisals of reservoir localities previously reported on were issued. Preliminary appraisals included statements on Davis Creek Reservoir site, in Nebraska; on Cannonball Reservoir, in North Dakota; and on Philip Reservoir site, in South Dakota. Supplementary statements were issued on Dickinson Reservoir, North Dakota, and on Shadehill Reservoir, South Dakota. Other preliminary reports completed but not distributed at year's end included: Bixby Reservoir, South Dakota; Moorhead Reservoir, on the Montana-Wyoming line; Rockyford Reservoir site, South Dakota; and Onion Flat, Raft Lake, and Soral Creek Reservoirs in Wyoming.

Eight papers dealing with archeological salvage operations in the Missouri River Basin during 1948 were published in the April 1949 issue of American Antiquity, quarterly journal of the Society for American Archeology. These included three reports by River Basin Surveys personnel, four by representatives of cooperating agencies, and one by the writer as Field Director of the Missouri River Basin Survey. Papers prepared by staff members of the Lincoln office and by the writer included the following titles: "Recent Investigations in Fort Randall and Oahe Reservoirs, South Dakota," by Paul Cooper; "Investigations in Western South Dakota and Northeastern Wyoming," by Jack T. Hughes; "Archeological Investigations in Medicine Creek Reservoir, Nebraska," by Marvin F. Kivett; and "Some Provisional Correlations in Missouri Basin Archeology," by Waldo R. Wedel.

A summary report prepared by the then Field Director on the activities of the Missouri River Basin Survey during calendar year 1948 was awaiting publication by the Smithsonian Institution as the year ended.

As in past years, the Lincoln office of the River Basin Surveys continued to furnish information, as requested, to the daily press, to various periodicals, and to other agencies and individuals. Archeologists in the field on several occasions addressed local groups interested in the excavations and findings in their particular localities.

Staff members in the Lincoln office participated in the sessions of the Seventh Plains Conference for Archeology, held at the University of Nebraska, in Lincoln, on November 25–26, 1949.

FIELD WORK AND EXPLORATIONS

During calendar year 1949, field work was carried on in the Missouri River Basin by two units of the River Basin Surveys. These were concerned exclusively with archeological researches, including surveys and excavations. Even this limited amount of field work, tragically inadequate in the face of the growing needs of the salvage program, were possible only because of transfer of funds by the National Park Service and the Bureau of Reclamation over and above the regular allotments received earlier in the fiscal year 1949.

The survey work began on May 27, when Richard P. Wheeler, archeologist, left Lincoln on a 46-day reconnaissance of 10 reservoir sites in North and South Dakota, Montana, and Wyoming. Assisted after June 2 by Neil Isto, student helper, Mr. Wheeler spent 1 to 4 days each at the following projects: Bixby, Philip, Rockyford, and Shadehill Reservoir sites in South Dakota; at Cannonball and Dickinson Reservoir sites in North Dakota; at Onion Flat, Raft Lake, and Soral Creek Reservoir sites in Wyoming; and at Moorhead Reservoir site on the Montana-Wyoming State line. The field work terminated early in July, and Mr. Wheeler returned to Lincoln on the 11th of the month to compile reports on his researches and then to prepare for further field assignment.

Under an emergency allotment received in June 1949 from the Bureau of Reclamation, the intensive surveys and excavations begun during the summer of 1948 at Angostura Reservoir, South Dakota, were resumed in early July. Jack T. Hughes, archeologist, was again placed in charge of this unit. He was aided in the field by George Metcalf, field assistant, J. M. Shippee, expert laborer, and a work force consisting of students and local labor. On September 3, Richard P. Wheeler replaced Hughes as field supervisor, and continued the excavations until November 8, when he returned to Lincoln for the winter.

Of the 11 projects where field work was conducted during 1949, 8 had not been previously surveyed by River Basin Surveys personnel for archeological materials. These included Bixby, Philip, Rockyford, Cannonball, Onion Flat, Raft Lake, Soral Creek, and Moorhead. Shadehill and Dickinson had been visited very briefly in 1946, and preliminary reports on their archeological possibilities were issued in 1947. All of the units listed above except Raft Lake were surveyed in preliminary fashion in 1947 for paleontological remains, and brief reports on this phase of the salvage operations were issued in August 1948. No paleontological field work was possible in the Missouri River Basin during 1949, owing to inadequate funds.

NORTH DAKOTA

Archeological work by the River Basin Surveys in North Dakota during 1949 consisted of reconnaissance at two Federal water-control projects. Cannonball Reservoir site, in Grant County, was surveyed during the period June 10–14; and on June 15–17, additional investigations were made at Dickinson Reservoir, first surveyed by the River Basin Surveys in 1946. Both units visited lie on westerly tributaries of the Missouri. The field party consisted of Richard P. Wheeler, staff archeologist, and Neil Isto, student helper.

Cannonball Reservoir site.—The site of the Cannonball Reservoir, an irrigation and flood-control project of the Bureau of Reclamation, is on Cannonball River in Grant County, southern North Dakota, some 60 miles west of the Missouri River. An earth-fill dam, now under construction about 5 miles southeast of Elgin, will rise 131 feet above stream bed; it will have a crest length of 1,690 feet, plus a dike section 4,310 feet long at the west end. The conservation pool (elevation 2,222 feet, m.s.l.) will have a surface area of 6,750 acres; at superstorage (elevation 2,269 feet, m.s.l.), the area flooded will be about 8,750 acres, and the pool will extend more than 25 miles upstream from the dam.

In the future pool area, the Cannonball meanders through a broad valley bordered by bluffs and lined with well-developed erosional terraces. The valley, as well as the rolling uplands to north and south, are covered with short grass. Trees occur sparingly, chiefly as small, scattered groves of cottonwood and box elder along the stream banks and in the adjacent coulees, with occasional juniper and aspen on the steeper valley slopes.

Approximately 4 days were devoted to the preliminary survey of the Cannonball Reservoir site in 1949. Only the lower 2 miles of the future pool area were thoroughly inspected; above this section, spot checks were made to a distance of about 19½ miles above the dam site.

Five sites of archeological interest, i. e., areas marked by surface features or refuse concentrations, were located and recorded, besides which a few scattering occurrences of stone artifacts and chips were noted here and there on the ground surface. Four of the sites consisted of boulder circles or tipi rings. Two of these were marked by a single boulder circle each; a third, 32GT20, in a borrow area near the dam site, consisted of 15 circles ranging in diameter from 15 to 20½ feet; and the fourth included two clusters of rings. No artifacts were found on or near any of these tipi-ring sites.

The fifth site yielded projectile point fragments, knife fragments, a stone drill, and miscellaneous chips, flakes, and spalls. No pottery was found, and limited tests revealed no artifacts or refuse below the sod. The site is believed to represent a temporary camp, but there are insufficient data to permit an estimate as to its age or cultural affiliations.

The results of the 1949 reconnaissance at Cannonball Reservoir do not suggest a great abundance of archeological remains or materials of any marked antiquity. Since only about one-fifth of the future pool area was examined however, it seems evident that further studies will be required before a final appraisal of the archeological resources here can be made. Since initial water storage is scheduled for 1951 or 1952, survey of the unexplored sections of the reservoir area should be completed at an early date.

On the basis of the 1947 paleontological survey, there appears to be no need for further salvage work in that line at Cannonball, barring unexpected finds during construction operations.

Dickinson Reservoir site.—The Dickinson Dam and Reservoir, an irrigation, flood control, and municipal water-supply project of the Bureau of Reclamation, is nearing completion on Heart River in Stark County, southwestern North Dakota. An earth-fill dam 49 feet high and having a crest length of 2,270 feet is under construction about 2 miles west of the town of Dickinson. At flood-control storage, the reservoir surface will be at 2,424.4 feet, m. s. l., and will have an area of 1,650 acres. The reservoir will have a length of about 4 miles, occupying the Heart River Channel and the lower portions of several tributary coulees.

Like neighboring streams to the north and south, the Heart River meanders through a moderately wide valley bordered by rolling uplands. In the reservoir area, there are extensive bottom lands and low terraces, frequently cut by old stream channels. Timber is sparse and of small size; where the land is not under cultivation, grass predominates.

Portions of the Dickinson Reservoir area were surveyed in preliminary fashion by a River Basin Surveys field party consisting of Paul Cooper and J. J. Bauxar on August 17 and 18, 1946. At that time, only two localities of possible archeological interest were noted: One on the north bank of the river just above the dam site, where a few modified flakes and refuse were found; the other on the south side below the dam site, where there were a few fragments of bone. Near this latter spot, according to a local informant, an Indian burial accompanied by a fragment of pipestone was unearthed previously.

In 1949, portions of 3 days were spent in further reconnaissance, chiefly in sections not visited during 1946. A few surface artifacts were found, including a side-notched projectile point, a drill point, a knife, and what is possibly an awl fashioned from the fibula of a horse; and from a cut bank on the east side of Ash Coulee, 30 inches below the ground surface, were taken six bison bones. No occupational, burial, or other sites worthy of detailed investigation were seen by, or reported to, the Survey party.

It is possible that the heavy brush and grass cover in the reservoir area has obscured some archeological remains, or that older material has been buried by deposition. The generally negative results of the two surveys made, however, suggest that no remains of importance will be lost by construction of Dickinson Reservoir. Unless construction or other developmental operations uncover remains of which no indication has so far been forthcoming, no further archeological work is recommended for this project.

The 1947 paleontological reconnaissance indicates that no serious loss of fossil remains will take place at Dickinson, unless construction uncovers materials not now apparent.

SOUTH DAKOTA

Much the greater portion of the 1949 field work of the Missouri River Basin Survey was carried on in various water-control projects in South Dakota. All of these operations, including surveys at four proposed and active projects as well as excavations at a fifth now nearing completion, were on tributaries of the Missouri west of the main stem.

The surveys, beginning in late May and continuing into early June, were made by Richard P. Wheeler, assisted after June 2 by Neil Isto, student helper from Newell, S. Dak. Leaving Lincoln on May 27, Mr. Wheeler visited the following projects in South Dakota: Rockyford, on the White River in Shannon County, May 29–30; Philip, on Bad River in Haakon County, May 31–June 1; Bixby, on Moreau River in Perkins County, June 4–5; and Shadehill, on Grand River in Perkins County, June 6–9. From this point, the party continued northward for further surveys in North Dakota and elsewhere.

In continuation of detailed investigations begun in 1948, intensive researches were carried on from July 10 until November 8, 1949, at Angostura Reservoir site, on Cheyenne River, southeast of Hot Springs. The field party here was under supervision of Jack T. Hughes, archeologist, until September 3; during the remainder of the season, Richard P. Wheeler was in charge.

Angostura Reservoir site.—Site of the Angostura Dam and Reservoir, an irrigation project now nearing completion by the Bureau of Reclamation, is on Cheyenne River about 9 miles south and east of Hot Springs, in Fall River County, S. Dak. The dam, approximately 130 feet high, will create a pool a mile or more wide extending southward nearly 4 miles, from which point it will narrow rapidly to the head of the pool 6 or 7 miles farther west. An arm of the reservoir will extend 3 or 4 miles to the southeast up the valley of Horsehead Creek, and there will be a shorter embayment in the lower valley of Dry Creek below Jackson Narrows.

The archeological explorations here in 1948 had disclosed some 71 sites in and near the future pool area. As indicated in a previous report in this series, that for 1948, none of the sites showed evidence of long occupancy, but there were good indications that many of the sites had been occupied repeatedly by small groups whose cultural equipment varied from period to period. For the most part, the sites yielded only stone artifacts suggestive of hunting and gathering economies; at three, small quantities of pottery were found. The range of time represented is somewhat uncertain, but was believed to cover a span of perhaps several millenia, extending up to shortly before the historic contact period. Owing to the relatively low yield from nearly all sites and the consequent need for extensive excavation on a large scale, the 1948 work consisted largely of what we may term intensive testing or sampling.

The 1949 investigations represented an extension and intensification of the work done in 1948. No attempt was made at complete excavation of any of the known sites. Instead, some 12 or 15 of the more promising ones, which also appeared to be representative of the several horizons thought to be present in the reservoir area, were tested by means of trenches and pits. The artifact yield, in general, continued disappointingly low; but the data will doubtless be adequate to allow the partial delineation of several more or less distinct complexes which evidently existed at different periods of time.

With initial storage of water scheduled to begin in the spring or early summer of 1949, the first work was necessarily directed to further exploration of several nonpottery sites situated on terraces to be flooded just above the dam. These included particularly sites 39FA10, 39FA56, and 39FA68, all lying about the junction of small waterways draining Red Canyon and Sheps Canyon a few hundred yards southwest of the dam. At 39FA10 (pl. 13, *a*) some 3 feet of sand was found to overlie a hardpan; within this sand were three culture-bearing zones separated and capped with light sterile deposits, the lowest of which lay directly on hardpan. Within the culture-bearing zones were hearths of various kinds, many flakes and chips, occasional bone fragments, and some artifacts, but no pottery. A few bits of graphite, presumably gathered for pigment, show utilization of one of the many mineral resources of the Black Hills. It is suggested that the three cultural zones represent occupation on as many separate occasions by groups whose cultural affiliations and time remain to be determined when wider comparisons have been possible.

At site 39FA56 there was evidence of two occupational levels. The upper contained pit hearths or roasting pits, with which seemed to be associated a few fragments of obsidian and occasional other materials; the lower included shallower basin-shaped hearths. Graphite is reported from this site also.

At site 39FA68, several trenches revealed a rather complicated situation. At one point there is a cultural deposit approaching 3 feet in thickness, overlain by nearly 2 feet of sterile deposit. Elsewhere, trenches from 1 to 3 feet deep disclosed windrows of burnt stones, hearths, charcoal, bone fragments, scrapers, a few blades, and various other remains. In the deepest test, a small lanceolate base-notched projectile point came to light at a depth of 6 feet. Two roasting pits are also recorded from the site. The levels are somewhat irregular, and the stratigraphy is evidently complicated by a variety of geologic features such as terrace fills, local gullying, etc. Further investigations here in 1950 are urgently needed, if possible with the assistance of geologists familiar with terrace problems.

Another series of sites investigated were four locations on Horsehead Creek, which joins the Cheyenne some 3 miles south of the dam. Extensive test pitting was done at site 39FA23, one of the few sherd-bearing sites in the locality and situated about 3 miles up the creek, on its south bank. The site appears to be actually on an abandoned and partially filled creek channel. Here were found small projectile points, scrapers, knives, manos, cord-roughened potsherds, and animal bone. Hearths and ash lenses were rather plentiful, but no good evidence of house sites came to light. What seems to be indicated is a series of brief occupations marked by thin discontinuous culture strata separated by alluvial materials presumably deposited by periodic overflows from the creek. There is no evidence of great age or prolonged residence, or of marked cultural differences between levels. The material found is somewhat reminiscent of the Upper Republican horizon, a pre-White culture widespread in Nebraska, northern Kansas, and adjacent regions.

Less than a mile upstream, where a small gully empties from the south into Horsehead Creek, is site 39FA30. Surveys here had shown several charcoal layers exposed in the shaly walls; and on the west side of the gully, where it joins the creek, several thick, cord-roughened Woodland sherds and a small projectile point had been found in situ. Excavations at this spot disclosed several more hearths and a deeply buried fireplace, as well as another small point, but no more sherds. It is possible erosion had removed most of the pottery component prior to the 1949 work. The opposite, or east, gully wall excavation (pl. 13, *b*) disclosed a few fragments of mussel shell, fractured pebbles, and some metate fragments dissociated from any of the charcoal lenses. The charcoal layers themselves proved unproductive; and it seems probable that, instead of being old occupational surfaces successively inhabited by peoples in a prepottery cultural stage, they actually represent burned-off grass surfaces subsequently buried by sand, gravel, and alluvium from the rapidly eroding patch of "badlands" nearby to the south at the head of the gully.

An intrusive and poorly preserved flexed burial, associated with a shallow broken metate, was also found in the east slope of the gully. Its age and cultural affiliations remain undetermined.

A few hundred yards downstream from the two sites just discussed, the cut bank on the north side of Horsehead Creek showed several layers of charcoal containing animal-bone refuse. This locality, thought to represent a possible prepottery site, was designated site 39FA61. Exploratory tests nearby yielded more bones, as well as burned stone fragments, flakes, and similar detritus. Further surveys in the vicinity resulted in discovery of a well-marked hearth partially eroded out of the south bank of the creek to the southeast of the earlier finds. Test pits showed cultural debris from just below the surface of the terrace to a depth of approximately 3 feet. This included miscellaneous chips and flakes, animal bones, shell fragments, drill points, scrapers, knives, a side-notched concave-base projectile point and another of simple triangular form, and a number of cord-marked and tooled potsherds from various depths. The scarcity of pottery-bearing sites in the Angostura locality, and the better than average yield of artifacts in the limited tests made, suggest the need for further investigations at this spot.

Among the more important finds of the 1948 season at Angostura, as reported in the annual summary for that year, were the evidences of a fairly early prepottery occupation at the Long Site, 39FA65. This lies on the north side of Horsehead Creek about 3 miles above its mouth, in a proposed recreational area. Well flaked lanceolate point fragments were found here, on the surface and in situ underground, along with small circular fireplaces without stones, and quantities of paper-thin flakes from the manufacture of chipped artifacts. Despite the low yield of artifacts, it seemed evident that there were relationships between these materials and those from other early sites in the Great Plains, where artifacts of the Plainview type were coming to light.

Further investigations at the Long Site in 1949 consisted of a thorough re-examination of the entire site surface, and excavations at the more promising exposures. At Area A, where hearths and projectile point fragments were uncovered in 1948, the tip of another obliquely flaked point was found in situ. At Area B, on the east edge and slope of a gully near the western part of the archeological zone, one well-defined fireplace and several possible hearths were uncovered, as well as a mano, but no points or other diagnostic artifacts came to light. At Area C, across the gully west of B, intensive test pitting disclosed charcoal fragments, occasional flakes, and bits of what appeared to be oxidized wood, but no concentrations of occupational debris were noted. Drift material in the form of fragmentary and complete artifacts were picked up on the gully slope below Area

C, and traces of one or two small hearths occurred at the edge of the exposure. It seems likely that the area worked here was actually peripheral to an occupational zone that was very largely destroyed by the cutting of the arroyo.

Despite the rather meager and unsatisfactory nature of the findings here in 1949, there would seem to be a good possibility of the existence between Areas A and B of additional occupational debris. The area involved covers several acres, however, and further exploration without benefit of power machinery would seem to be of dubious value and decidedly uneconomical. The stripping of overburden to whatever depth is necessary to expose a large area of the old occupational level would perhaps result in a somewhat fuller and more adequate picture of the situation.

Several sites in the middle and upper portions of the reservoir area were also tested during the 1949 season. These included two locations at which pottery occurred sparingly, namely, site 39FA45 on Dry Creek, and site 39FA48 on the south side of Cheyenne River about a mile below the mouth of Dry Creek. Meager samples only were recovered at these stations; no structural features were noted. Farther upstream, in the general vicinity of Jackson Narrows, sites 39FA35, 39FA38, and 39FA42 were briefly investigated. At the second of these, 39FA38, tests to a depth of 2 or 3 feet disclosed two dark soil zones separated and covered by light wind-blown sand. Chips, animal bones, a mano, a blade fragment, and other items came to light here, as well as a sherd from the surface. No outstanding finds were made at any of these sites.

In addition to the sites investigated in the future reservoir area, brief trips were made from time to time in search of other remains in the general vicinity. A number of interesting and hitherto unreported petroglyph groups were recorded, chiefly along the Cheyenne River above the future pool area. At one, designated 39FA78, there are many and varied drawings, including several large anthropomorphic figures resembling dancers, each of whom has a zigzag serpentine figure dangling from the mouth in what suggests a representation of a snake dancer. There is a detritus-laden talus below the cliff on which these figures occur, and some of the figures extend to a depth of several feet below the surface of this talus. Charcoal lenses and probable hearths occur at depths of approximately 2 and 10 feet in the edge of the river terrace lying between the inscribed surface and the Cheyenne River. At another site, 39FA79, a mile or two down river and just above the head of the reservoir area, several groups of figures done in varied style occur. What is evidently a recent group includes a thunderbird, feathered lances, and numerous small anthropomorphic figures carrying guns, all done in a pleasingly precise fine-line technique. Nearby are other groups done in rather broad shallow lines, and still others which are delineated by wide lightly pecked lines. In a few places the sandstone surface has unquestionably been smoothed by rubbing in preparation for the drawings; a mano found at the base of the ledge may well have been used for this very purpose. It would seem likely that the differences in technique evidenced by these groups probably have chronological significance; but, other than the clearly late groups including representations of guns, there is no way of associating the groups at present with one or another of the prehistoric occupations with whose remains the Cheyenne River Valley abounds.

The 1949 investigations at Angostura have amplified the picture of native utilization of the area in prehistoric times, as judged from previous findings, although the broad outlines remain fundamentally the same as at the end of 1948. In general, the region appears to have been intermittently occupied by a long succession of native peoples throughout a period of perhaps several millennia. None of the sites yet investigated shows evidence of prolonged continuous occupation, or of intensive pursuit of horticulture. The pottery-bearing sites have disclosed no satisfactory evidence of semipermanent structures such as are found at sites of the semihorticultural peoples farther east and south. Such evidence may, of course, yet come to light with more comprehensive excavation. The general impression, however, is one of frequent but short-lived occupations of the locality by culturally impoverished hunting and gathering peoples, or by lightly equipped seasonal foraging parties of peoples who normally resided elsewhere. One would suppose from this that the rather varied resources of the Black Hills, including an abundance of native game animals and fur bearers, of wild fruits and berries, and of useful stones and minerals, were perhaps as important to prehistoric men as they were to the bison-hunting nomadic tribes—Cheyenne, Sioux, and others—of the historic period.

The strategic importance of the Angostura locality in working out the prehistory of the northern plains west of the Missouri River is perhaps worth emphasizing again. This importance rests on the fact that here are to be found westward extensions of pottery horizons much more fully represented to the east and south, as well as nonpottery manifestations with relationships to the west. If, from the researches preceding actual flooding of the pool area, it becomes possible to work out a reasonably sure chronological and cultural sequence of the pottery and nonpottery complexes evidently present, then the somewhat nebulous picture of native man's occupancy of a vast and little-worked region in the northern short-grass plains centering in the Black Hills area, may be measurably clarified and sharpened. The prospects for thus establishing geographically broad correlations seem promising enough to outweigh the relatively low returns from the current investigations in terms of artifact yield.

Bixby Reservoir site.—The site of the proposed Bixby Reservoir, an irrigation and flood control project of the Bureau of Reclamation, is on Moreau River in northwestern South Dakota. The dam site is about 1 mile west of Bixby, and the future reservoir area extends westward up the Moreau about 24 miles. Dam specifications, reservoir data, and construction plans have not been furnished the River Basin Surveys, and the project appears to be inactive at the present time.

The proposed reservoir area lies approximately 100 miles west of the Missouri River, and less than half that distance northeast of the Black Hills. Here the Moreau meanders through a relatively narrow, bluff-bordered valley. Along its banks and those of its intermittent tributaries are clumps of cottonwood and box elder. The adjoining uplands are treeless and, where not under cultivation, are characterized by a short-grass flora.

In the 2 days available for preliminary survey at Bixby, only a small portion of the area could be examined. Two sites of archeological interest were noted. One of these, 39PE10, is situated less than a mile upstream from the proposed dam site, atop a small knoll on the south bank of the river (pl. 14, *b*). Here were collected some 50 fragments of pottery, sand- and grit-tempered, gray to buff in color, and undecorated; a dentalium shell bead; a mano fragment; and a miscellaneous assortment of chips, blades, cores, and other oddments. The chronological position and cultural affinities of this material cannot be determined from the evidence available at the moment.

The second site lay about 2½ miles to the west, in a short arroyo south of the river. A few small chipped flint artifacts, along with refuse chips, flakes, and weathered animal bone, were found here on the sandy, sloping surface of the arroyo. There were no sherds, and it is possible that a preceramic or nonceramic complex is represented.

In view of the uncertain status of Bixby with regard to construction, no further work is recommended for the present. Should the project become active, however, it would seem worthwhile to initiate test excavations at the two sites found, and also to investigate thoroughly the remaining portions of the future reservoir area.

At present, there appears to be no need for paleontological salvage work at Bixby, unless construction discloses material not now known.

Philip Reservoir site.—The site of the proposed Philip Reservoir, an irrigation and flood-control project of the Bureau of Reclamation, is on the North Fork of Bad River, in southern Haakon County,

S. Dak. The dam, for which alternate sites are proposed, is to be 2½ to 3 miles west of the town of Philip. The reservoir will flood portions of the North Fork and Mexican Creek Valleys for a distance of about 5½ and 2 miles, respectively, above the dam. The project is inactive at present.

The reservoir site lies about 100 miles west of the Missouri River and approximately the same distance east of the Black Hills, along a natural route for hunting parties traveling from the main stem villages to the hunting grounds of the upper Cheyenne River Basin. The stream valleys are narrow and thinly timbered with hardwoods; the adjoining uplands are covered with short grass and cactus. It is not a locality that would be expected to invite prolonged occupancy by semisedentary peoples.

In the 2 days devoted to search of the proposed reservoir area, no sites or materials clearly of archeological significance were seen. Occasional chips collected on the ground surface may have been produced by natural rather than human agencies. No further archeological work seems called for here, unless future construction activities bring to light promising materials of whose existence there is now no visible evidence or other record.

The 1947 paleontological survey suggests that further search for fossils should be made in the Pierre shale exposures at Philip if the project becomes active.

Rockyford Reservoir site.—Rockyford Reservoir, a Bureau of Reclamation project for irrigation and flood control purposes, is proposed for a site on White River, near the northern boundary of the Pine Ridge Indian Reservation in Shannon County, S. Dak. The dam is to be situated about 1 mile north of the town of Rockyford, whence the reservoir will extend some 17 miles upstream. Dam specifications and additional reservoir data were not available at time of the survey, and the project appears to be currently inactive.

In the locality of the proposed reservoir, the valley of White River is cut into the fossiliferous Oligocene White River formation which here, as elsewhere in the drainage of the White, gives rise to a sparsely vegetated and rather rugged badlands terrain. Erosional terraces are extensively developed in the locality, and include a flood plain much wider than would be expected from such a comparatively small stream as the present White.

The 1949 survey was restricted to an examination of both sides of the valley in the vicinity of the dam site, plus a search of the flood plain, terraces, and ravines on the east side of river upstream to the bend above the mouth of Wounded Knee Creek, some 4 or 5 miles above the dam site. The west, or left, bank of the stream in the future pool area remains unexplored.

Three sites of archeological interest were recorded, and sample collections of surface materials were made at all three. Nonpottery materials only are represented.

Two of the sites, 39SH1 and 39SH2, are situated in terraces; the third, 39SH3, lies atop a small flat-topped butte comprising the remnant of one of the higher terraces. Especially promising is site 39SH1, which is on the east side of the valley approximately 3 miles south of the dam site (pl. 15, *a*). Here, about a mile west of a prominent feature known locally as Chimney Butte, a well-marked occupational stratum covered by as much as 3 to 4 feet of sandy soil has been exposed around the terrace edges. Eroding from this stratum are animal bone refuse, chips, flakes, worked stone artifacts, and similar vestiges of former human activity. In the containing matrix may be seen bits of charcoal and occasional streaks of ash. In the two visits made to the site by River Basin Surveys personnel, in June 1948, and again in May 1949, specimens collected included corner-notched projectile points, blade and knife fragments, end scrapers, drills and gravers, mano (?) fragments, and refuse bone. The consistent absence of pottery, as noted by all observers to date, and the topographic position of the deposit at some depth beneath the terrace surface, suggests the possibility that a moderately early preceramic complex may be represented; but there are insufficient data at hand to warrant assignment of the materials to any of the known archeological complexes or horizons of the western plains.

At site 39SH2 a few flakes, cores, and chips were collected on the eroded slope below the terrace surface, and in a nearby draw some bone fragments and chips were noted about 6 inches below the terrace surface. Neither this nor the third site, 39SH3, where worked stone and refuse were noted only on the present ground surface, seem quite so promising as the first one described.

In the event that the Rockyford Reservoir project becomes active, it will be advisable to develop a program for further investigations in the area. Because of their promise of yielding additional information on the little-known preceramic occupations of the Badlands locality, extensive systematic testing and perhaps large-scale excavation would seem advisable at site 39SH1 and possibly at 39SH3. Further survey is also needed in those parts of the reservoir area not yet searched, which lie mainly on the west side of the White River.

In view of the extensive exposures of White River deposits and their high fossil content, further paleontological work may be needed here if Rockyford becomes an active project.

Shadehill Reservoir site.—The Shadehill Reservoir, an irrigation, flood-control, and water-supply project of the Bureau of Reclamation, will be located at the junction of the North Fork and South Fork of the Grand River in northeastern Perkins County, S. Dak. An earthfill dam and dike, now under construction about 14 miles south of Lemmon, will have a maximum height above stream bed of approximately 120 feet and a total crest length of some 13,000 feet. The conservation pool, at an elevation of 2,272 feet, will cover approximately 4,850 acres; superstorage at 2,312 feet will inundate approximately 12,250 acres. At maximum pool level, the reservoir will occupy about 3.5 miles of the main valley, plus some 23 miles in the North Fork Valley and 18 miles in the South Fork Valley.

A preliminary visit was made to Shadehill by a River Basin Surveys party in August 1946. In less than two days' work, the following features were noted: a possible tipi-ring site with flint chips, three areas marked only by flint chips, two stone piles and two depressions of unknown significance, and three deposits of bone that were thought to be of possible paleontological interest. No sites of great size or obvious importance came to light, but the desirability of further investigations was indicated.

The 3 days spent at Shadehill in May 1949 were devoted to a careful recheck of the area about the dam site and to a search of the previously unexplored portions of the pool area on the North Fork. A few specimens were collected, including four side-notched projectile points, two knives or scrapers, a hammerstone, chips, flakes, cores, and animal bones; but there were no concentrations of material or other evidences of occupational or burial sites.

The apparent scarcity or absence of sites that would seem to warrant further investigation is rather surprising, since the valley of the Grand appears to offer a logical natural route of east-to-west and west-to-east travel. The reservoir area lies less than 100 miles west of the Missouri, and would seem to be within the range of territory doubtless visited by the Arikara, Mandan, and perhaps other tribes formerly resident along the main stem in northern South Dakota and southern North Dakota. Ludlow Cave, from which chipped-stone implements, bone and shell artifacts, coiled basketry fragments, and potsherds suggesting "a generalized Mandan-Hidatsa type" have been reported, is approximately 60 miles to the west, on the headwaters of the South Fork. Surface deposits in the same site yielded metal projectile points, glass beads, and other objects evidently left by hunting peoples of the historic period. One would suppose from this that the valley of the Grand would have been a frequently used route of travel in prehistoric and historic times, and that the banks of the stream would show plentiful evidence of that fact.

It is possible, of course, that such sites as may once have existed here have been destroyed by cultivation or are obscured by water- or wind-deposited soils and vegetation. At the moment, however, no further archeological work seems to be called for; nor, judged by the 1947 paleontological survey, will there be need for further investigations along that line. Should construction activities or related operations uncover archeological or paleontological remains not now known, the above recommendation would, perhaps, be subject to revision.

WYOMING AND MONTANA

Archeological researches by the River Basin Surveys in Wyoming and Montana during 1949 consisted exclusively of reconnaissance at four proposed Bureau of Reclamation water-control projects. Projects visited, in all cases for the first time by archeological survey units, included: Moorhead Reservoir site, on Powder River in Montana and Wyoming; and three small projects—Onion Flat, Raft Lake, and Soral Creek—in the upper Big Horn River Basin, in west central Wyoming.

The proposed Soral Creek and Raft Lake Reservoirs lie within the Wind River Indian Reservation. Grateful acknowledgment is here made to the Business Council of the Shoshones and Arapahoes for granting permission to the River Basin Surveys for the surface investigations.

The work at these four projects was carried out by a field unit consisting of Richard P. Wheeler, archeologist, and Neil Isto, student helper. This party operated on the following schedule: Moorhead, June 19–23; Onion Flat, June 28–29; Soral Creek, July 1–2; and Raft Lake, July 5–7.

Moorhead Reservoir site.—The site of the Moorhead Dam and Reservoir, an irrigation and flood-control project now under construction by the Bureau of Reclamation, is on Powder River in southeastern Montana and northeastern Wyoming. The dam, situated less than 2 miles south of Moorhead, Mont., will be an earth-fill structure 220 feet high, with a crest length of 2,700 feet exclusive of a 550-foot dike section at the west abutment. The flood control pool (elevation 3,542.5 feet, m. s. l.) will have a surface area of 18,300 acres, extending approximately 32 miles upstream from the dam through Powder River County, Mont., and into Sheridan and Campbell Counties, Wyo. Initial storage of water is scheduled for the spring of 1952.

The Powder River rises in the arid plains of central Wyoming and, through its western tributaries, drains much of the eastern slope of the Big Horn Mountains. In the reservoir area, it is a silt-laden stream meandering sluggishly through a wide, alluvial valley. Erosional terraces are well developed; occasionally, in cut banks above the present flood plain, buried soil zones may be observed. The valley margins are hilly to rugged in character, often with "badlands" areas. Straggling stands of cottonwood, willow, box elder, and ash grow on the sand bars and along the stream banks, while juniper and yellow pine cover the "breaks" flanking the valley. Short grass is characteristic of the locality generally.

In the 5 days devoted to preliminary survey at Moorhead in 1949, a careful inspection was made of both sides of the river to a distance of about 5 miles above the dam site, including also the lower portions of Dry and Bitter Creeks. In addition, spot checks were made here and there along the east bank of the stream to a point about 20 miles above the dam site. The investigations resulted in the locating of four archeological sites.

Two of the sites, lying on opposite sides of the river just above the mouth of Clear Creek in the upper part of the future pool area, Sheridan County, Wyo., consisted of boulder circles or tipi rings ranging in diameter from 14½ to 21 feet. No cultural material was found on or near either of these sites.

Two other sites lay about a mile southwest of the dam site, on the west side of the valley (pl. 14, *a*). Cultural debris collected from the surface included fragmentary projectile points, broken blades, scrapers, chips, spalls, and bones. No hearths or other features were noted, and limited tests disclosed no evidence of subsurface occurrence of refuse or artifacts. Both sites are thought to represent temporary camps; but in the absence of a definitive sample of the archeological complexes represented and until a chronological and cultural framework has been worked out for the region, none of the remains can be assigned to a definite time period or cultural horizon.

None of the four sites seen are believed to merit further investigation. In view of the relatively small portion of reservoir area examined, however, and because the reservoir is situated in an area about which virtually nothing is known archeologically, it is recommended that a comprehensive survey of the entire pool area be made before flooding takes place. The project lies in an area where little evidence of semisedentary pottery-making peoples would be expected, but there would seem to be an excellent chance of finding remains of preceramic or other nonceramic hunting and gathering complexes. Indications of such remains have been reported from the Yellowstone Valley, into which the Powder empties a few miles southwest of Terry, Montana, and also to the southeast in Keyhole and Edgemont Reservoir sites in the Belle Fourche-Cheyenne drainage. It is possible that a painstaking search of all cut banks and other exposures in the Moorhead Reservoir area would disclose significant remains not now known to science.

In the limited time spent at Moorhead during the 1947 paleontological reconnaissance, no identifiable fossils were obtained.

Onion Flat Reservoir site.—The site of the proposed Onion Flat Dam and Reservoir is on Devil Dive Creek, a small dry tributary of the Little Popo Agie River about 10½ miles southeast of Lander, Fremont County, Wyo. A dam some 1,680 feet long, with a dike section at each end, will impound water to be diverted from Little Popo Agie to form a pool extending approximately 1½ miles upstream.

The future pool site is a broad valley with gently sloping sides and a shallow meandering stream channel, which is usually waterless. Trees are absent; the valley slopes and bottoms are covered with a luxuriant growth of sagebrush and short grass. In its present condition, the locality would seem to offer little inducement to occupancy by native peoples.

Two days' search of the reservoir area by the River Basin Surveys field party resulted in discovery of a single site of archeological interest. This is situated about 225 yards northwest of the downstream face of the proposed dam. Here, in a relatively restricted area some 40 yards across, cultural materials were collected as follows: three projectile point fragments, two scrapers, a drill point, one complete and five fragmentary manos, five hammerstones, a chopper, cores, chips, and animal bones. No hearths or other structural or habitational features were noted and limited tests disclosed no cultural materials below the surface. It is presumed that the site represents a temporary camp; its cultural affiliations and chronological position cannot be determined from evidence at hand.

No further archeological or paleontological salvage work is recommended for Onion Flat Reservoir site, unless construction activities disclose important materials not now apparent.

Raft Lake Reservoir site.—Raft Lake, source of the North Fork of the Little Wind River, is picturesquely situated about 19 miles due west of the town of Wind River, in western Fremont County, Wyo. It lies just east of the Continental Divide, at an elevation of about 10,000 feet, and is about 1½ miles long. The proposed dam, in a deep gorge just below the present outlet, will raise the present water surface somewhat.

Much of the lake margin consists of rugged-to-precipitous granite walls, with little ground suitable for sustained human occupancy. At the northeast end there is a small sand-dune area. Narrowleaf cottonwoods, willows, and aspen fringe the lake, and the nearby slopes bear heavy stands of juniper, lodgepole pine, spruce, and fir.

Two days were spent in examining the locality by boat and afoot. No evidence of aboriginal occupancy was noted.

No further archeological salvage work is recommended for Raft Lake Reservoir site.

Soral Creek Reservoir site.—Site of the proposed Soral Creek Reservoir is on the North Fork of the Popo Agie River, about one-quarter mile above the mouth of Soral Creek and some 18 miles by road south of the town of Wind River, in Fremont County, Wyo.

The reservoir will be a small one, extending upstream about 1.6 miles from the dam site. The valley to be flooded is narrow, and is bordered by sandstone cliffs and steep bluffs. The valley floor and slopes are covered with grass and sagebrush; a few pines may be found along the cliff tops and clumps of willow are scattered along the creek banks.

Search of the future pool area and adjacent slopes disclosed a few scattered flint chips, two groups of animal bones without associated cultural material, and some markings on the cliffs. The bones have been identified as those of dog, bear, deer or antelope, bison, cottontail rabbit, and possibly sheep. The chips may have been caused by natural agencies. The cliff markings appear to be modern, perhaps the initials of ranchers; no Indian petroglyphs were found.

There would seem to be no need for further archeological or paleontological salvage operations in the Soral Creek Reservoir area.

FIELD WORK BY COOPERATING AGENCIES

It is a pleasure to report that several of the State-supported agencies which had participated in scientific salvage work during 1948 were again active in 1949. This cooperative work was particularly timely in view of the very limited scope of operations that could be undertaken by the River Basin Surveys. In Nebraska there were three cooperating organizations working in as many different water-control projects. On a smaller scale the same sort of work was done in Kansas, Montana, and North Dakota. As in previous years, no Federal funds were available to support these researches; all the operations were on a voluntary and unsubsidized basis. It is gratifying to report that at year's end there were indications of a substantial improvement in this latter respect, with procedures under consideration whereby the National Park Service would provide financial assistance on a contractual basis to qualified cooperating agencies.

In the pages which follow, I have sought to present brief summaries of the outstanding findings by the several cooperating agencies in 1949. It is to be hoped that more extended and definitive statements will be offered in due course by those directly connected with the work. My remarks here are based primarily on data provided in progress reports made from time to time by these agencies, in accord with their agreements with the River Basin Surveys. In those few instances where no such reports were furnished, my comments will rest largely on bits of information gotten from field personnel and thus will be even less complete than would be desirable. In a few instances it was possible for River Basin Surveys representatives to visit the scenes of activity by cooperating groups. I am grateful to the agencies concerned and to their representatives for making available such advance data as are here offered.

KANSAS

Cooperative archeological investigations in Federal water-control projects in Kansas were carried on in 1949 as part of a larger field research program sponsored by the Museum of Natural History of the University of Kansas. The work was done by students under the direction of Dr. Carlyle S. Smith. It involved rechecking of certain sites in two proposed Bureau of Reclamation reservoir areas previously visited briefly by River Basin Surveys personnel, namely, Cedar Bluff on the Smoky Hill River and Wilson on the Saline River; and preliminary reconnaissance in a small portion of a third proposed reservoir, Glen Elder on the Solomon River, where no survey had previously been attempted by the River Basin Surveys.

Cedar Bluff Reservoir site.—The Cedar Bluff Reservoir, a project of the Bureau of Reclamation, will be situated on Smoky Hill River about 18 miles south of Wakeeney in Trego County, Kans. It is an earth-fill structure with a height of 204 feet and a crest length of 12,515 feet. When full, the pool will be about 14 miles long and will have a maximum width of about 2 miles. The terrain which will be directly affected is part of the short-grass plains; small clumps of cottonwood and willow occur along the river banks, and juniper is to be found on the valley slopes.

Of the four sites recorded here by the River Basin Surveys party in 1947, two were briefly reexamined in 1949. They are situated about one-half mile apart and approximately 2 miles upstream from the proposed dam site. One is designated 14TO2, the other 14TO3. The surface of the first was littered with flint chips, besides which fire-cracked stones and occasional chipped-stone artifacts were noted. Among the artifacts were broken end scrapers, side scrapers, and knives, as well as a crudely made projectile point with broad stem and thick blade. Several small test pits revealed undisturbed subsoil immediately below the plowed zone; no layer of refuse or occupational debris was manifested. It is possible that additional tests on a larger scale, made when crop and soil conditions are more favorable for search than at the time of the two brief visits in 1949, would disclose more remains.

At 14TO3, chips and a few fragments showing secondary work were found on the surface. No recommendation for further investigation here has been made.

In general, it does not seem likely that materials of great scientific importance are threatened by the Cedar Bluff Dam and Reservoir.

In view of the virtual absence of data on the archeology of the locality, however, it seems advisable that a thorough search be made of all remaining unexplored portions of the future pool area.

Glen Elder Reservoir site.—The site of the proposed Glen Elder Dam and Reservoir, an irrigation and flood-control project of the Bureau of Reclamation, is on the Solomon River in Mitchell County, north central Kansas. The dam site is just above the town of Glen Elder. Specifications are not available, but it appears that the reservoir will flood the Solomon Valley for some 10 or 12 miles to the west from Glen Elder, including both the North Fork and South Fork into eastern Osborne County.

With the assistance of a local collector, the University of Kansas party located and recorded two sites that are subject to destruction and six outside the future pool but in the immediate locality.

Both of the former are pottery-bearing sites, although pretty certainly of distinct cultural affiliations and different temporal position, and both lie very close to what will be the work area if and when dam construction gets under way. Site 14ML1 is on a lofty hilltop at the west edge of Glen Elder, overlooking the Solomon River. Already partly destroyed by a gravel pit at its southern edge, the site will undoubtedly suffer further damage and possibly complete destruction from the dam, the north end of which will reach the present gravel pit.

In the limited time available for survey work here in 1949, only two small test trenches were attempted. One disclosed a small basin-shaped pit containing limestone fragments and a few potsherds. The other yielded a cache of planoconvex end scrapers and prismatic knives. A painstaking search of the surface, part of which was covered with growing corn and alfalfa, netted several hundred sherds and a number of stone artifacts. The work in general confirmed the observations of previous investigators, also based on surface collections and very limited test pitting, that the site is rather distinctive ceramically by comparison with other known village sites of Kansas. There are apparently close similarities to site 25HN39, recorded in 1946 by a River Basin Survey field party on Prairie Dog Creek in Harlan County Reservoir site, Nebraska, and to various small sites scattered through other reservoir areas in the Nebraska region. If construction is undertaken at Glen Elder, further excavation at 14ML1 is urgently needed to define more clearly the nature of the archeological complex here represented.

Site 14ML8 is located south of Glen Elder and southeast of the preceding site. It occupies part of a low terrace on the south bank of the Solomon. An abundance of mussel-shell fragments and occasional sherds of prehistoric Upper Republican type were found here. No test digging was attempted.

Wilson Reservoir site.—Wilson Reservoir, a flood-control and irrigation project of the Bureau of Reclamation, is proposed for the Saline River in Lincoln and Russell Counties, Kans. The proposed dam site is at the eastern edge of Russell County; no specifications for the structure or for the resulting reservoir are available. It is estimated, however, that the reservoir will extend westward up the Saline approximately 20 miles to a point north of the town of Russell. An arm of the pool will extend southeastward up Hell Creek into the southwestern corner of Lincoln County.

A very brief 2-day reconnaissance by a River Basin Surveys field party at Wilson in 1947 had disclosed the location of six sites of archeological interest. At three of these, petroglyphs were noted. At a fourth, approximately one-fourth mile south of the proposed dam site, charcoal and animal bone, some of the latter burned, were found at a depth of 56 inches below the terrace surface. At another location, on the north side of the valley near the head of the future pool, tests in one of a series of grass circles disclosed bone fragments and charcoal at a depth of 8 inches. Near the mouth of Paradise Creek, which enters the Saline near the head of the reservoir, worked stone, shell and bone fragments, and a few small potsherds of unidentifiable type were found. From these findings, made at a time of year when surface conditions were not particularly favorable for collecting, it appears that further search will be in order before dam construction is completed.

The very limited operations of the University of Kansas party here in 1949 added little to the earlier record. Uncertainty regarding roads prevented a visit to site 14RU2; and a heavy fall of rain brought to early termination an effort to recheck the nearby petroglyphs. If and when the construction project is finally set in motion, further archeological investigations would seem to be in order.

MONTANA

In Montana, a small field party from the Montana State University under supervision of Carling Malouf devoted several weeks in August and early September to investigations in the Canyon Ferry area, some 15 miles east of Helena. Preliminary surveys here in 1946 and 1947 by field units of the River Basin Surveys had disclosed a total of 32 sites in and near the reservoir area, not all portions of which could be examined in the time then available for field work. A summary of the principal findings here to the end of 1947, together with a brief statement as to the character of the region involved, appears in the published report of the Missouri River Basin Survey for that year.

The 1949 investigations of the Montana State University here were devoted largely to a recheck of sites reported previously in the future pool area, plus reconnaissance downstream in search of comparative materials. Approximately 12 sites not hitherto reported were examined, and small quantities of surface material were collected. As in the previous operations, it was found that most of the sites yielded very little surface material. Chips were plentiful in many localities; but many of these were identified by the investigators as of natural, i. e., nonhuman, origin. A number of tipi-ring sites were located; numerous chips and a few projectile points associated as surface refuse with one of these groups raises the hope that a more or less distinctive point type may eventually be identified with the boulder circles.

The surface remains recovered consisted mostly of lithic materials, i. e., of chipped and other stone. No traces of pottery came to light, despite careful search; nor did the work uncover signs of any aboriginal structures, of rock carvings, or of stone alinements other than tipi rings. Tests in several supposed rock cairns suggesting burial structures yielded only negative results.

The general impression left by the findings of the university party was that of an area occupied only sporadically and for short periods of time, perhaps primarily in connection with seasonal hunting and gathering activities. At no point were remains found in such abundance or under such circumstances as to suggest intensive or prolonged and continuous occupation by communities of any appreciable size.

NEBRASKA

Three State agencies were engaged in cooperative scientific salvage operations in Federal water-control projects in Nebraska during 1949. During June and July, the second summer field session of the University of Nebraska Laboratory of Anthropology, under the leadership of Dr. J. L. Champe, continued excavations begun in 1948 at archeological sites in Harlan County Reservoir area on the Republican River. From June until early September, the University of Nebraska State Museum carried on excavations at archeological sites in Medicine Creek Reservoir under the immediate supervision of E. Mott Davis; and in addition, had paleontological parties at Medicine Creek and Harlan County Reservoirs. The Museum's field operations were under the general supervision of Dr. C. B. Schultz and W. D. Frankforter. The Nebraska State Historical Society, between June 5 and August 13, tested several archeological sites in the proposed Mullen Reservoir area on the North Loup River in Hooker County. Marvin F. Kivett, formerly on the River Basin Surveys staff and now Director of the Museum for the Historical Society, was in charge of this latter work.

A brief résumé follows of investigations and findings by these agencies at each of the areas concerned.

Harlan County Reservoir site.—This locality is situated in southern Harlan County on the Republican River just north of the Kansas-Nebraska State line, about 200 miles west of the Missouri River. It is of especial archeological interest because within the relatively restricted area to be flooded there are village sites evidently attributable to four cultural complexes representing as many distinct aboriginal occupations of the region by pottery-making peoples. These cover a time span of at least seven or eight hundred years, and possibly considerably more. Some of the earlier horizons appear to be correlated with buried soil zones or old surfaces which, since abandonment of the sites, have been covered with wind-deposited soils. The probability would seem to be very good that through the archeological remains some of these buried soil surfaces may eventually be dated, and that the suspected climatic fluctuations will then be fitted into a longe-range picture of prehistoric weather conditions.

The 1949 operations of the University of Nebraska Laboratory of Anthropology at Harlan County Reservoir were mainly a continuation of excavations begun in 1948 at site 25HN37. This site is located on the left bank of Prairie Dog Creek 3 miles from its junction with the Republican River and 5½ miles southeast of Alma, Nebr. Two house sites, resembling in most particulars the three previously opened, were excavated. One of these had evidently burned and collapsed; portions of the charred timbers and other structural elements lay on the floor in approximately their original relationship to one another, thus providing exceptionally good information on the size and construction of the original edifice. Noteworthy, too, was the finding of an iron axhead partially embedded blade down in the ash-filled fireplace of this structure. This piece, of course, furnishes incontrovertible proof of contacts, direct or indirect, between the former Indian occupants of the site and white men, and thus confirms the relative lateness of the site as judged from its relationship to other similar sites to the south and west. The source of this trade piece, whether Spanish, French, or English, must await its examination by a specialist. Other artifacts and debris recovered during the investigations were in general similar to materials recovered during the 1948 work. The site is assigned to the Dismal River culture, and probably represents a settlement of Plains Apache of approximately the late seventeenth or early eighteenth centuries.

Other sites in the vicinity were also investigated, including especially an Upper Republican house ruin at 25HN11, a half mile east of 25HN37. The evidence here, though somewhat confusing, suggests the possibility of more than one structure on the spot. Refuse and cultural material of the usual prehistoric Upper Republican type, and considerable quantities of mussel shells, were also found here.

The evidence obtained by the Laboratory party at Harlan County in 1949, added to that from the preceding year's work at the same locality, will be a noteworthy increment to Central Plains prehistory, particularly as regards the new data for the Dismal River culture.

Two representatives of the University of Nebraska State Museum spent approximately two months in Harlan County Reservoir area salvaging fossils from the core trench for the dam and also from the borrow pits. Some fish and reptilian remains were recovered from the Cretaceous Niobrara chalk in the core trench; elsewhere, Pliocene and Pleistocene deposits yielded fragmentary mammalian specimens. These latter are reported to be of much promise in terrace studies now under way by the Museum in the Republican Valley.

Medicine Creek Reservoir site.—This locality is on Medicine Creek, a small but perennial northerly tributary of the Republican River in Frontier County, some 25 miles northeast of McCook. Extensive excavations were made here in 1948 by the River Basin Surveys in cooperation with the Bureau of Reclamation. These resulted in accumulation of a very large body of data concerning the prehistoric Woodland and Upper Republican occupations, the only two pottery-including complexes so far found within the reservoir area itself.

In 1949 archeological and paleontological investigations were carried on in the same locality by the University of Nebraska State Museum, under the immediate field supervision of E. Mott Davis. Sites investigated include 25FT41 and 25FT42, both situated on Lime Creek, and site 25FT50, on the right bank of Medicine Creek below the mouth of Lime Creek. All of these are prepottery stations long antedating the pottery-bearing sites previously worked by the River Basin Surveys and the Nebraska State Historical Society in the same locality.

At site 25FT41, the lower occupational zone, now designated zone C, which was worked by the Museum in 1947, was again explored. The limits of the zone of occupancy were extended somewhat, but little or no material of diagnostic value was recovered. At one place, bones and flint flakes were found about 4 feet above the lower zone, presumably indicating another habitation level. Approximately 8 feet above zone C and perhaps 40 feet below the surface of the terrace, still another refuse-marked zone was found. A hearth with associated burned bone, flint spalls, and several artifacts were recovered here. Most significant finds were two points apparently corresponding in all significant particulars to points found at Plainview, Tex., in association with fossil bison, and since named Plainview points. Also present were the midsection of an obliquely flaked point, several nondiagnostic scrapers, and knives. Pieces of charred wood found in the terrace fill, both above and below the occupational zones, have been prepared for Carbon 14 dating tests. According to the University of Nebraska State Museum paleontologists in general charge of the work, the two (or three?) occupational levels at site 25FT41 occur "at the base of a Republican River Terrace 2 fill, tentatively dated as pre-Mankato (prior to climax of the Mankato glaciation)." No confirmatory faunal or paleontological evidence has yet been adduced in support of this dating.

At site 25FT42, a hearth area with bones, scrapers, and blades was partially uncovered. No diagnostic artifacts identifying the culture represented have yet come to light. Indications are that the site may have been occupied and reoccupied many times. Geologically, "the site is believed to be contemporaneous in part with 25FT41."

In the south bank of Medicine Creek some 3 miles north of 25FT41, a concentration of flint and bones was found about 7 feet below the terrace surface. Ten feet below this concentration was noted a soil zone with a hearth but without apparent artifact associations. The possibility of a third zone some 10 feet still lower down is suggested by shell fragments.

At site 25FT50, excavated in 1948 and subsequently reported in print, some time was devoted to the gathering of faunal materials which might give further clues to age of the cultural deposits. Two large portions of bison skulls, a nearly complete deer antler, and other materials were recovered south of the portions worked for archeological remains in 1948. Flint chips were noted here, but there were no diagnostic artifacts.

Paleontological work at Medicine Creek included investigations at two fossil quarries, 25FT40 and 25FT49, by students under supervision of Loren M. Toohey of the Museum. Results were not as good as those in previous seasons. Some new evidence was recovered, however, including a complete skull of a fossil beaver. These quarries are said to be of late Pliocene age. A test trench at site 25FT49 on Mitchell Creek yielded bones of carnivores, rhinoceros, camel, horse, rodent, etc. Additional work has been recommended for this locality.

Mullen Reservoir site.—The locality proposed for this project by the Bureau of Reclamation is on the Middle Loup River in northeastern Hooker County, in the heart of the Sand Hills region. Tentative plans called for a dam at one of several possible sites 5 or 6 miles east of the town of Mullen and north of State Highway 2. The proposed reservoir would extend approximately 7 miles northwest up the river valley.

Preliminary reconnaissance here by a River Basin Surveys field party in the spring of 1947 had disclosed eight sites of varied age and origin, several of which appeared worthy of further and more detailed investigation. When the Nebraska State Historical Society was programing its cooperative salvage work in the spring of 1949, the Mullen project carried a fairly high construction priority, and early research at archeological localities near the dam site seemed called for. Subsequently it was learned that the Bureau of Reclamation work schedule had been revised and that construction at Mullen had been indefinitely postponed. It was decided, nevertheless, that the Historical Society would continue with its plans for work here, since the region is little known archeologically but has been visited from time to time by Society archeologists.

The 1949 investigations of the Society at Mullen consisted of extensive tests at several Dismal River village sites and at one very promising Woodland site. At 25HO21, on the south bank of the river directly on the axis of proposed dam site No. 2, several fireplaces, scattered post molds, and occasional small pits, but no house structures, were uncovered. Stonework and pottery were not especially plentiful, but bone artifacts were relatively abundant. Four miles upstream at site 25HO7, also on the south bank, artifacts of stone, bone, and pottery were collected, and also a single piece of iron. The cultural zone here was covered by 1 to 5 feet of sterile sand and clay. Tests were also made at sites 25HO9 and 25HO24, both on the south bank of the stream between the two preceding sites. All of these are assigned to the Dismal River culture, which is believed to represent the Plains Apache of the late seventeenth and early eighteenth centuries. It will be interesting to see whether and to what extent the material culture inventory at these Dismal River complex sites in the Sand Hills region differs from that at such culturally related sites as 25HN37 in Harlan County Reservoir area. The distance between the two localities is not great, being less than 150 miles airline; but the environmental setting of the Hooker County sites differs rather markedly from that of the Republican River Valley. When the recent findings at both localities have been reported in full, our understanding of the early historic Apache groups of the Central Plains will be very materially enriched.

The 1949 work at Mullen disclosed remains of at least two other prehistoric complexes in the locality. One of these is a Woodland manifestation represented by an interesting site lying on proposed dam site No. 1, slightly more than a mile below proposed dam site No. 2 and the Dismal River site 25HO21. Here were found heavy grit-tempered cord-roughened sherds, apparently from large vessels, a few points and other flints, occasional bone objects, and lenses of charcoal and ashy soil. The cultural stratum, first located in a roadside cut, sloped upward as the excavations continued back from the face, but the slope was more gradual than that of the present grass-covered ground surface. When work was discontinued, the sherd level was at a depth of 7 feet or more underground. Laterally, to east and west, its distribution is restricted by shallow swales; its ultimate limit southward under the rising valley slope, is undetermined.

Surface remains seen during the surveys carried out from time to time suggest that Upper Republican materials, presumably intermediate in time between the prehistoric Woodland and the protohistoric Dismal River are also present here. No work was done in any sites that can be attributed to this horizon. Local collections seen included many and varied point types, including fragmentary Folsom points. It seems certain that when thoroughgoing studies of this locality are made a long sequence of occupations, probably beginning with early hunter or lithic manifestations, and continuing through a series of later prehistoric and protohistoric pottery and hunting horizons will emerge. Thus, despite their superficially uninviting appearance, the Nebraska Sand Hills promise a rich return for anyone willing to seriously investigate their archeological resources.

NORTH DAKOTA

Organized archeological salvage operations proposed by the University of North Dakota did not materialize on the scale of the preceding season, owing to deficiencies of transportation and pending personnel shifts. Dr. Gordon Hewes of the University's staff devoted several days to investigations in Garrison Reservoir above Sanish. Limited test trenching was done at site 32MN9 on the left bank of the Missouri River, about 1½ miles above Little Knife River. This site was selected for further testing because preliminary reconnaissance in 1947 by a River Basin Surveys field party had disclosed evidence of possible stratification of cultures. Pottery samples were collected at that time from two zones—one in the upper 8 inches, the other from 12–16 inches deep. These indicated at least two wares of rather distinct and different character, each associated with a definite type of projectile point. The markedly different character of the remains from each of these two levels, and the clear separation of the two zones, strongly suggests two occupations. Since the site lay well below the conservation pool level, further investigation seemed called for.

The location of the test trenches opened by Dr. Hewes, in relation to those made previously by the Surveys party, has not been determined. However, the test trenches opened by Dr. Hewes failed to disclose any stratification comparable to that noted in the earlier work, and no pottery was found. Other remains were so limited in amount that additional digging did not appear to be warranted. Surface observations at other sites in the vicinity were equally unrewarding. It would appear that the later investigations by Hewes may have been in another part of the site from that in which the first tests were made, and it is possible that extension of his explorations, which time did not permit, might have yielded different results more in line with those of the earlier observers.

CONCLUSIONS

In appraising the work of the Missouri River Basin Survey in 1949, as compared to that of preceding years, several considerations must be borne in mind. For one thing, there is a great and growing urgency about the scientific recovery program as a result of the rapidly expanding and constantly accelerating water-control program. On the part of the construction agencies, projects already begun are being pushed toward completion, and in some instances impoundment of water is well advanced. Elsewhere, new construction is getting under way at all too frequent intervals. This, of course, was to be expected; and so when the River Basin Surveys program was set up, it was hoped that the recovery operations could expand and go into large-scale excavation more or less simultaneously with expansion of the construction work. Unfortunately, however, funds for field work other than survey have been difficult to get, and the proposed excavation projects for which money has been sought regularly have materialized only in a few exceptional cases. In 1949 the major obstacles to accomplishment on the scale called for were again factors largely beyond our control; namely, the allotment of funds inadequate to set in motion the detailed plans that had been worked out in good time. It is to be hoped that a substantial portion of these plans can be realized in the coming year; but since the program of the construction agencies was not slowed down as drastically by fiscal uncertainties as was that of the River Basin Surveys, the bleak fact remains that one field season was largely lost to the organization specifically charged with responsibility for the scientific recovery work in the Missouri River watershed.

The setback thus imposed was felt in some measure in all portions of the Missouri Basin, but has hit hardest in those sections where destruction of archeological remains, at least, will be most complete and far-reaching—the valley of the Missouri main stem in North and South Dakota. Here the work of the Corps of Engineers at Fort Randall and Garrison Dams is well advanced, and perhaps three or four more seasons at most will see the structures completed to the point where impoundment of water and flooding of archeological sites will take place. A third major project, Oahe Dam near Pierre, S. Dak., is also expected to get under way shortly. In all these, impoundment of water will result in the complete obliteration of hundreds of village sites, burial grounds, and other features that cannot be duplicated anywhere else in the region or outside it. No one even slightly acquainted with the many and varied remains in this area can view their impending submergence except with grave concern and the hope that a determined effort may yet salvage a worthwhile segment of the materials facing destruction.

Recognizing, then, the factors that operated to prevent a large-scale excavation program on the Upper Missouri and at certain smaller projects in the Montana-Wyoming region, we may still say that the year's activities produced some worthwhile results. The reconnaissance of hitherto unsurveyed proposed reservoir sites in the Dakotas, Wyoming, and Montana disclosed, for one thing, several additional localities that will bear more intensive examination if construction plans become active, and indicated at the same time that certain other localities can probably be written off as unpromising from the standpoint of human and cultural remains. The intensive researches carried on at Angostura by the River Basin Surveys, and those which were conducted at Harlan County, Medicine Creek, and Mullen through the welcome cooperation of State agencies, have added significant data to our understanding of various phases of the pre-White occupancy of those localities. To these and other accomplishments in the field must be added the less obvious and less easily appraised achievements in the laboratory, where progress was made in the preparation of scientific reports and in the organizing and preservation of basic data pertaining to previous and current researches.

With reference to current field work and researches stemming therefrom, the year's activities in the Missouri River watershed by the River Basin Surveys and the cooperating agencies again represented a wide range of interests temporally and spatially. Sites that are demonstrably early and may well have a multimillenial antiquity were investigated by the River Basin Surveys at Angostura and by the University of Nebraska State Museum at Medicine Creek. Materials probably or certainly on a later time level were examined at Angostura, Harlan County, Mullen, and at a number of other proposed and active projects in Kansas, South Dakota, North Dakota, Wyoming, and Montana. Most of the 1949 work in these latter reservoirs, as noted in an earlier section, was of very brief duration and preliminary in character, and so its evaluation must await completion of more intensive investigations than have yet been possible.

Materials evidently bearing on the problem of "early man" in the Missouri Basin came under observation at two widely separate localities. At one, the Long Site (39FA65) in Angostura Reservoir, the artifact yield has been distressingly low, but surface and subsurface finds, some of the latter in association with buried stoneless hearths, suggest relationships with the Plainview, Tex., finds, and with others in the northern plains that apparently have a respectable antiquity. Unfortunately, there is virtually no bone refuse and so no direct comparisons are possible with the excellent series of extinct bison remains found at the Plainview discovery site. As indicated in a previous section, it would appear that a considerable part of the original Long Site has been destroyed by gullying, but it is still possible that additional information could be obtained by large-scale stripping of the overburden on the stream terrace between the known outcrops of archeological materials.

In Medicine Creek Reservoir, the discovery of projectile points of unquestionable Plainview type in an occupational horizon at site 25FT41, on Lime Creek, is of interest. That the site is as old as has been claimed in press releases and preliminary reports, which give it a "pre-Mankato climax" dating, has not been demonstrated to the general satisfaction of archeologists and geologists. The fact that evidence exists of a statification of cultural deposits, some of which may be older than the level in which the Plainview points were found here, lends added importance to the site.

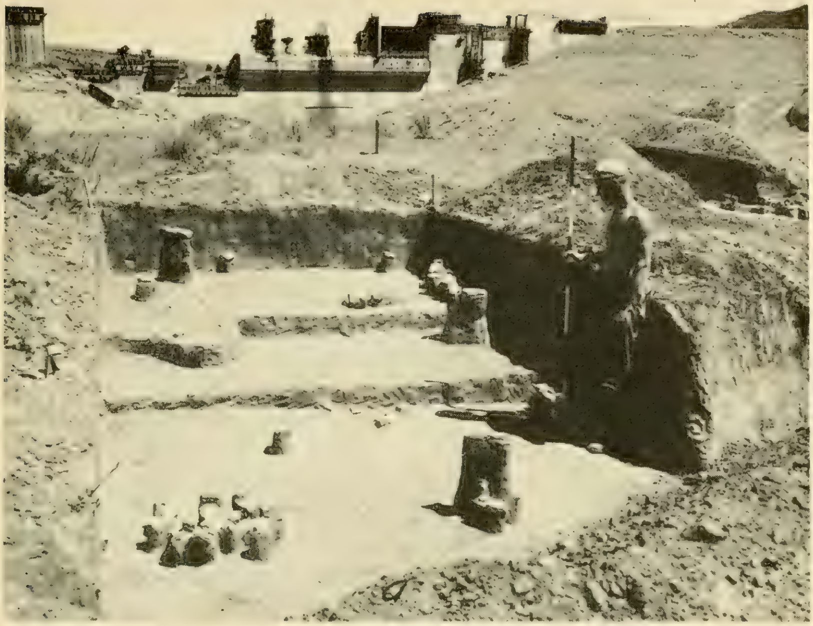
Very likely generally later in time than the Lime Creek and Long Site remains are the numerous nonceramic sites reported from many parts of the Angostura locality, frequently in association with buried soil surfaces of unknown antiquity. These sites are marked by hearths of various kinds and by thinly scattered stone artifacts; bone refuse is scarce or absent. Under ordinary circumstances, the materials that can be recovered from these stations are usually so limited in quantity and kind as to preclude convincing segregation into meaningful sequential series. Through the limited use of earth-moving machinery as well as hand labor, and the stripping of sizable parts of the old occupation surfaces, it has been possible at Angostura to gather somewhat larger samples of the remains. To what extent these will permit the delineation of distinct cultural horizons will become evident only after detailed laboratory analysis of the data recovered. Meanwhile, we may note that more or less similar sites and materials have been recorded previously by River Basin Surveys personnel at many other reservoir areas throughout the Wyoming-Montana region. It is presumed that they represent the remains of a series of native hunting and gathering peoples who successively, but perhaps not continuously, inhabited the region through a span of time that probably covered several millenia. It is perhaps unnecessary to observe here that not all nonceramic remains in this region are necessarily to be regarded as preceramic or of great antiquity; some of them doubtless represent the traces of seasonal hunting camps of peoples of relatively recent periods who dwelt at other times in more permanent villages situated elsewhere. There seems to be nothing in the archeological findings to date to contradict the view that the western plains in much of present Wyoming and Montana were occupied throughout most of prehistoric time, as in the historic period, by small bands of roving hunters and gatherers who had no fixed settlements comparable to those of the semihorticultural peoples in the eastern plains.

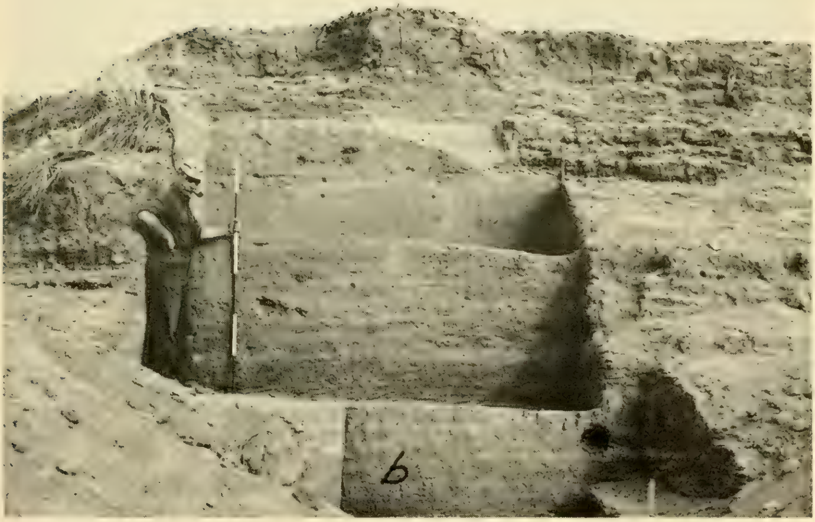
The investigations at pottery-bearing sites in Angostura, Harlan County, and Mullen Reservoir areas, has contributed useful information concerning some of the later prehistoric and protohistoric peoples who resided in this region within, roughly, the last thousand or fifteen hundred years. Discovery on Horsehead Creek at Angostura of a site (39FA30) yielding heavy, cord-roughened sherds suggests the presence here of an early pottery-making people presumably related to the Woodland culture, or cultures, so widely represented throughout the trans-Missouri plains. Other buried material of evident Woodland affiliation came to light at Mullen. At neither of these locations was it possible to obtain a very extensive series of artifact types or a clear picture of the sort of community and people represented.

On a later time level are the materials disclosed by investigations in an Upper Republican village site at Harlan County and the perhaps related camp-site remains at site 39FA23 at Angostura. In Harlan County, the prospects seem excellent for getting not only a good definition of the local Upper Republican horizon but also for establishing its association with an old buried soil surface which might eventually be datable thereby. Fortunately, the University of Nebraska Laboratory of Anthropology which is carrying on the cooperative archeological work at this locality, is cognizant of these prospects, and we may hope that continued inquiries will throw further light on the interrelated problems of prehistoric archeology here and its inferred climatic setting. At Angostura, it is not yet clear whether the Upper Republicanlike site or sites represent only temporary hunting camps reoccupied briefly from year to year or alternatively are to be regarded as locally specialized manifestations of a prehistoric village-dwelling people who elsewhere subsisted in considerable measure by horticultural pursuits.

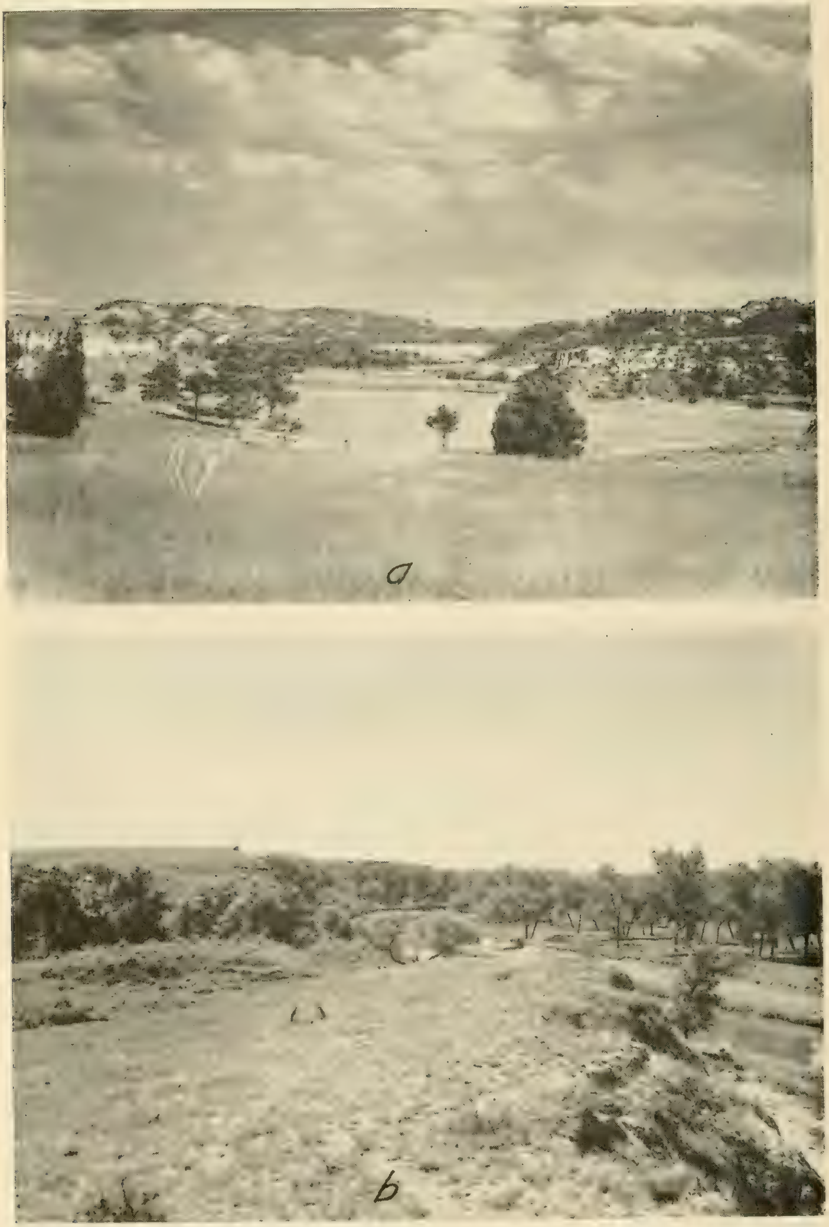
The work done in 1949 at Dismal River culture sites in Harlan County Reservoir and at Mullen is significant because it ties in the upper end of an archeological sequence with early historic documented data bearing on Indian-White contacts. There remains little doubt that these sites are assignable to a late seventeenth or early eighteenth century Plains Apache occupancy, and that the White contacts indicated were in the period when Spanish and French interests were important in the region. The data now at hand ought to contribute materially to a more accurate characterization of the mode of life and the cultural equipment of the early historic Plains Indians, and perhaps also to a clearer perception of the antecedents from which the defined archeological horizon was derived.

It is apparent from the foregoing remarks that the all-too-limited archeological field work conducted in 1949 in the Missouri River Basin has resulted in no startlingly new views or scientific concepts, nor did it disclose any hitherto totally unknown or unsuspected archeological complexes. At the same time, it can truthfully be said that numerous details have been added here and there to help fill in the still sketchy outline of human prehistory which has been gradually taking on more substance as field work goes forward. There can be no question that our knowledge of Missouri Basin prehistory, demonstrably a long and involved story, will continue to advance as additional data are gathered in the field. These data are badly needed from all portions of the Basin, from the sparsely peopled west as well as from the more heavily populated east. With no intention of minimizing the scientific usefulness of what has been done or professional interest in the localities that have been worked intensively to date, it is still timely to record the sad fact that in the section of the Missouri Basin where the largest and richest remains of prehistoric peoples occur in greatest profusion, a large-scale and continuing excavation program still remains a thing of the future—a future, be it noted, that with a few more years of neglect will become archeologically forever a little-known and dimly understood past.

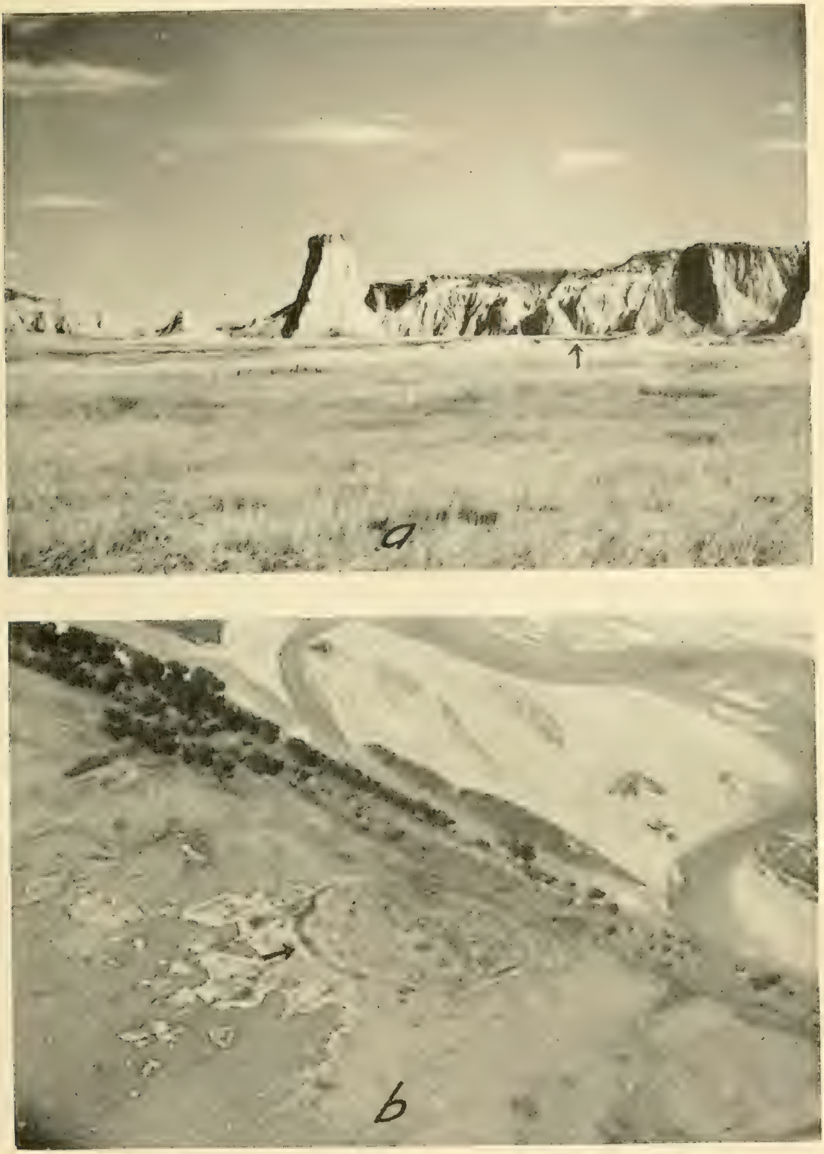




a, Site 39FA10, Trench B, showing archeological remains at various levels; Angostura Dam in background. Fall River County, S. Dak. (Neg. 39FA10–30.) *b*, East test trench at site 39FA30, on Horsehead Creek, Angostura Reservoir, Fall River County, S. Dak. Neg. 39FA30–34.)



a, Site 24PR2 at edge of sandstone cliff (foreground); looking southeast toward Powder River and Bitter Creek. Moorhead Reservoir, Montana-Wyoming. (Neg. 24PR2–2.) *b*, Site 39PE10 (on knoll in foreground), looking west up Moreau River Valley. Bixby Reservoir site, Perkins County, S. Dak. (Neg. 39PE10–2.)



a, Chimney Butte from Manderson-Rockyford Road, with low terrace and site 39SH1 (arrow) in middle distance. Rockyford Reservoir site, Shannon County, S. Dak. (Photo by R. G. Slattery.) *b*, Site 39ST14 (Scotty Phillips Ranch), a fortified Arikara village site in the work area just below Oahe Dam; Stanley County, S. Dak.

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River Basin Surveys Papers, No. 3

The Woodruff Ossuary, a Prehistoric Burial Site in Phillips County, Kansas

By MARVIN F. KIVETT

CONTENTS

PAGE

Foreword 107
Environmental background 109
Previous archeological work 111
Description of Woodruff Ossuary (site 14PH4) 113
Artifacts 118
  Pottery 118
  Work in antler and bone 119
  Work in stone 121
  Work in shell 123
Résumé 126
Cultural relationships 130
Skeletal remains of the Woodruff Ossuary 137
Literature cited 141

ILLUSTRATIONS

PLATES

16. *a*, View to southwest toward Woodruff Ossuary, site 14PH4. *b*, Looking northeast across burial pit, site 14PH4, after the removal of plowed soil 142
17. *a*, Looking southeast across burial pit, site 14PH4, showing section walls. *b*, Discoloration which marked Feature 1, a pit, at depth of 12 inches, site 14PH4 142
18. *a*, Looking south across burial pit at site 14PH4, after removal of all disturbed soil. *b*, Feature 16, site 14PH4, a partially articulated adult skeleton 142
19. *a*, Feature 8, site 14PH4, an area of scattered human bones showing some articulation. *b*, Feature 9, site 14PH4, a pit filled with disarticulated human bones 142
20. *a*, Feature 21, site 14PH4, looking south. *b*, Feature 21, site 14PH4, after removal to the laboratory in a plaster cast 142
21. *a*, View in east area of burial pit, site 14PH4, showing typical disarticulated condition of bones. *b*, Sherds from burial pit, site 14PH4 142
22. *a*, Bone and antler artifacts from site 14PH4. *b*, Stages in manufacture of shell disk beads, site 14PH4 142
23. *a*, Chipped-stone artifacts from site 14PH4. *b*, Stone artifacts from site 14PH4 142
24. Artifacts from site 14PH4 142
25. Marine and fresh-water shell ornaments, site 14PH4 142
26. *a*, Artifacts from various sites. *b*, Sherds from Guide Rock Ossuary (site 25WT3) 142
27. Restored vessel of the Harlan Cord Roughened type from site 25FR8 142
28. Four views of male skull (14PH4–1436) from Woodruff Ossuary 142

FIGURES

2. Plan of Woodruff Ossuary after excavation 110
3. North-south profile across Woodruff Ossuary on E1 line 118

FOREWORD

The report that follows is based primarily on data collected for the River Basin Surveys, Smithsonian Institution, during the summer and fall of 1946.

Other comparative data were gathered by personnel of the River Basin Surveys during the field season of 1948 in Frontier County, Nebr. Data for many of the sites came from the collections made by A. T. Hill, which are now at the Nebraska State Historical Society. Many people assisted in the investigation of those sites.

The excavation party during the fall of 1946 included J. M. Shippee of the River Basin Surveys, A. T. Hill, director emeritus of the Nebraska State Historical Society who, because of his long interest in this problem, spent considerable time at the site, and the writer. One local man, Carol Franke, of Woodruff, Kans., assisted part time.

I wish to express our thanks to John Horrell, of Woodruff, Kans., who granted permission for the excavations and assisted in many other ways. For criticisms and suggestions as this report progressed, I am indebted to Dr. Waldo R. Wedel, Paul L. Cooper, and Dr. John L. Champe. Robert B. Cumming, Jr., has provided a preliminary study of the skeletal material. Identifications of shell specimens were made by Dr. J. P. E. Morrison and Dr. Harald A. Rehder, Division of Mollusks, United States National Museum. I wish to thank Dr. James C. Olson, superintendent of the Nebraska State Historical Society, for permission to use certain data from the collections of the Society.

THE WOODRUFF OSSUARY, A PREHISTORIC BURIAL SITE IN PHILLIPS COUNTY, KANSAS

By Marvin F. Kivett

ENVIRONMENTAL BACKGROUND

Phillips County is situated in the Loess Plain area of north-central Kansas and borders on Nebraska to the north. The county is part of a broad, gently eastward-sloping, loess-mantled plain, which has been modified by the valleys of Prairie Dog Creek in the northwest section and of the North Fork Solomon River in the southern half of the county. Numerous north-south drainages tributary to these streams have carved the surface of the plain into a series of long, nearly parallel, north-south divides which extend at about right angles to the major streams. To the north, between Prairie Dog Creek and the Republican River in Harlan County, Nebr., drainage channels are numerous and the upland surface has been carved into a rather intricate system of steep-sided canyons separated by narrow and, in many places, sharp divides.

Prairie Dog Creek, a perennial stream, heads in Sherman County, northwest Kansas, and flows in a generally northeast direction to its confluence with the Republican River in Harlan County, Nebr. The course of the stream is meandering, but the current is rather swift so that the channel is gradually being deepened. A few springs occur on the valley slopes along the Republican River and Prairie Dog Creek.

Alluvial lands, which include the terraces and flood plains, occur in continuous strips along both Prairie Dog Creek and the Republican River. The width of the alluvial lands, which is greatest along the Republican, varies from a few yards to 2½ miles. Lower terraces or benches are well developed and usually occur at heights of 10 to 25 feet above the bottom lands. The flood plains occur in strips of various widths bordering both sides of the channels, and are subject to inundation in places during periods of high water.

The Prairie Dog Valley is now utilized mainly for the growing of corn, but some small grain is also grown. The uplands and steeper slopes are often grass-covered and are given over to grazing. Native timber borders the stream bed; cottonwood, willow, elm, ash, and box elder are the main species. Wild fruits such as plums, chokecherries, and grapes are rather abundant along the stream course.

For a description of the area as it appeared a century ago, we turn to an account of John C. Fremont's second westbound expedition of 1843. The party camped for 1 night on the stream which still bears the name they gave it, "Prairie Dog" (Fremont, 1887, p. 174). They entered the area from the south, after traveling up the North Fork Solomon River. Fremont observed bands of antelope and immense herds of bison to the south and, on June 23, 1843, noted the following:

> At noon on the 23d, we descended into the valley of a principal fork of the Republican, a beautiful stream forty feet wide and four feet deep, with a dense border of wood, consisting principally of varieties of ash. It was musical with the notes of many birds, which, from the vast expanse of silent prairie around, seemed all to have collected here. We continued during the afternoon our route along the river, which was populous with prairie dogs (the bottoms being entirely occupied with their villages), and late in the evening encamped on its banks.
>
> The prevailing timber is a blue-foliaged ash (*Fraxinus* near F. *Americana*), and ash-leaved maple. With these were *Fraxinus Americana*, cottonwood, and long-leaved willow. We gave to this stream the name of Prairie Dog River.

On June 25, while traveling west along the high smooth ridges south of the Republican River, the party observed "buffalo in great numbers, absolutely covering the face of the country" (Fremont, 1887, p. 174).

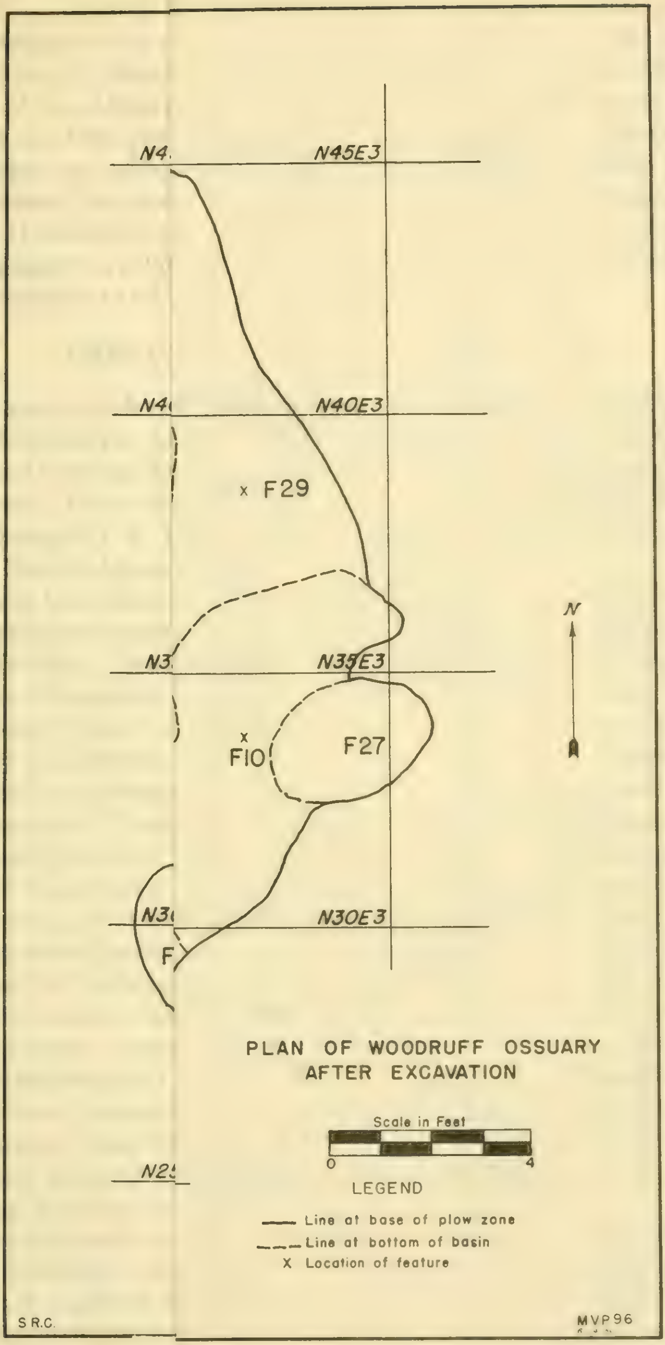
Since the advent of white men, large game such as bison and antelope have disappeared but considerable small game, including rabbits, opossums, raccoons, skunks, coyotes, prairie dogs, and pheasants, is common in the area today. There are some beaver and waterfowl along the stream.

It is evident that the area offered many inducements for primitive horticultural peoples, as well as for those wholly dependent on the results of the chase. Tributary streams such as Prairie Dog Creek, with a supply of wood, shelter, game, and arable ground, were readily available. Flood-free benches and terraces along the streams provided safe sites for villages. Sufficient timber was at hand for firewood and for lodge construction. The rich alluvial soils in the valleys, sufficient rainfall, and a frost-free growing season adequate for the maturing of such native-grown crops as maize, beans, and squash, made the area especially attractive for groups dependent in part on horticulture. The vast herds of bison which roamed the area would have provided a plentiful meat supply.

During and probably for several centuries before the historic period, the area which includes the lower sections of the Prairie Dog Valley made up part of the Pawnee hunting grounds. Their nearest historic village appears to have been the Hill site (25WT1) [1] on the

---

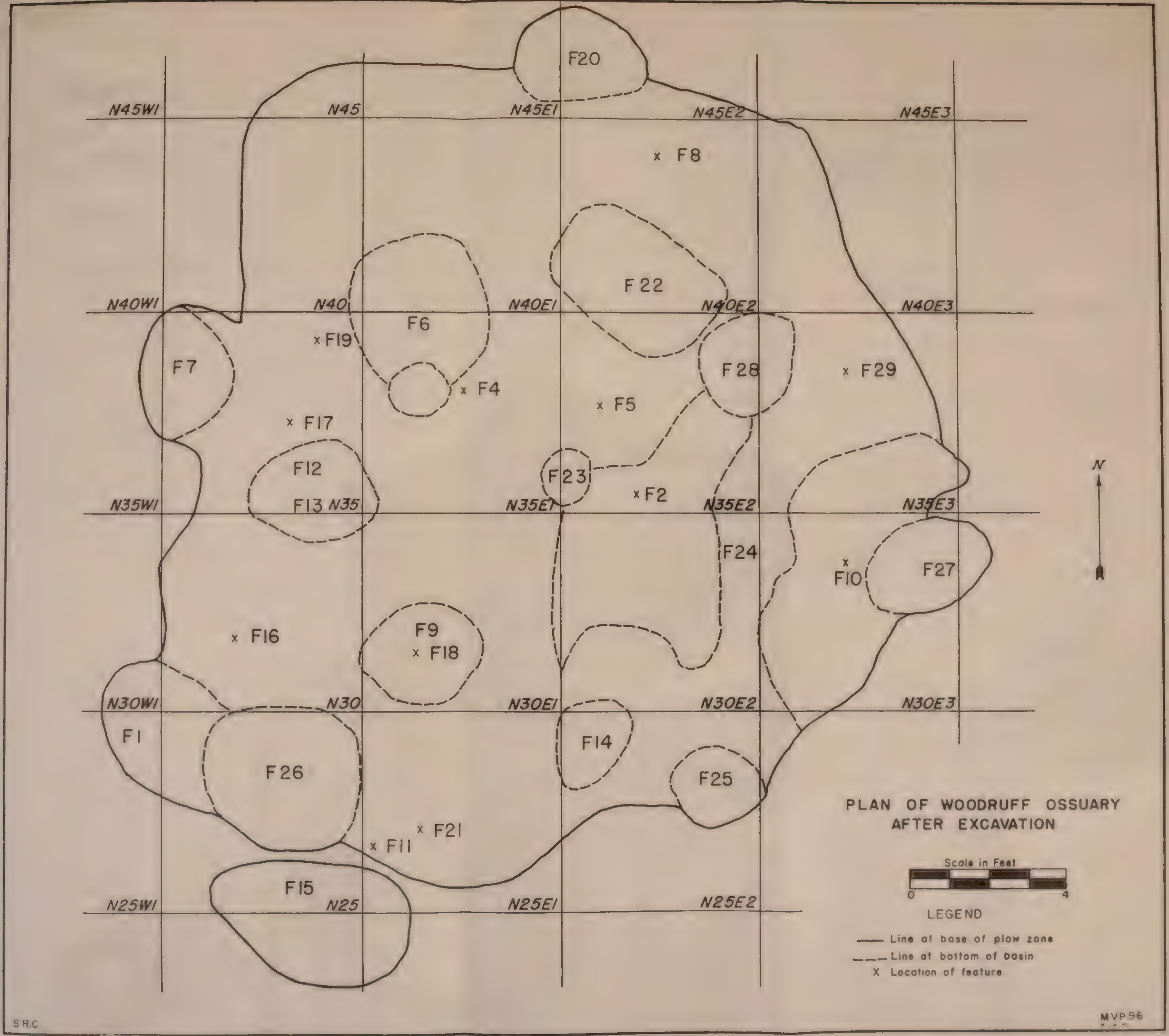
[1] Site designations used in this report are trinomial in character, consisting of symbols for State, county, and site. The State is indicated by the first number, according to the numerical position of the State name in an alphabetical list of the United States; thus, for example, 25 indicates Nebraska, 14 indicates Kansas. Counties are designated by a two-letter abbreviation; for example, HN for Harlan County, PH for Phillips County, etc. The final number refers to the specific site within the indicated State and county.


N4
N45E3
N4
N40E3
x F29
N3
N35E3
x
F10
F27
N
N3
N30E3
F
N2
Scale in Feet
0
4
LEGEND
Line at base of plow zone
Line at bottom of basin
X Location of feature
S.R.C.
MVP96

PLAN OF WOODRUFF OSSUARY AFTER EXCAVATION

on.

953842 O-52 (Face p. 110)


F20
N45W1
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N45E1
N45E2
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x F8
F22
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F6
x F19
F7
F28
x F29
x F4
x F5
x F17
F12
F23
x F2
N35W1
F13
N35
N35E1
N35E2
N35E3
F24
x
F10
F27
N
x F16
F9
x F18
N30W1
N30
N30E1
N30E2
N30E3
F1
F26
F14
F25
PLAN OF WOODRUFF OSSUARY
AFTER EXCAVATION
x F21
x F11
Scale in Feet
0
4
F15
N25W1
N25
N25E1
N25E2
LEGEND
Line at base of plow zone
Line at bottom of basin
X Location of feature
S R C
MVP 96

FIGURE 2.—Plan of Woodruff Ossuary after excavation.

953842 O-52 (Face p. 110)

ublican River in Webster County, Nebr., some 60 miles to the east. village, so far as can be determined, was visited in the summer 1806 by Lt. Zebulon M. Pike while he was en route to the head-aters of the Arkansas (Wedel, 1936, p. 17). Other historic groups ch as the Oto and Cheyenne also made some use of the valley.

At least one village site, 25HN37, located approximately 8 miles downstream, has been examined and assigned to the Dismal River aspect (Champe, 1949, pp. 285–292). This complex is believed to be assignable to a late prehistoric and early contact period and may be attributable to a Plains Apache group.

PREVIOUS ARCHEOLOGICAL WORK

The area which comprises Harlan County and the valleys of the Republican River and its tributaries to the east in Franklin and Webster Counties, Nebr., has been the scene of considerable archeological work. Prior to 1930, numerous sites were found in the Republican drainage by A. T. Hill, later director of the Nebraska State Historical Society Museum.

During the summer of 1930 the Nebraska State Archeological Survey under the direction of Dr. W. D. Strong excavated sites in Webster, Franklin, and Harlan Counties, as well as in several other counties throughout Nebraska. Excavations by the Survey in Harlan County were confined largely to two burial sites on the south bank of the Republican River. The first of these, the Graham Site (25HN5), is situated on the summit of a rounded hill, southwest of the junction of Prairie Dog Creek with the Republican River. Here, in a nearly circular basin, which was 23 to 24 feet in diameter and 3 feet 6 inches deep in the center, were found human remains associated with a considerable number of artifacts. The majority of the remains were disarticulated, but two of the burials, both of infants, appeared to be primary interments. Scattered throughout the pit with the human remains were numerous pottery sherds; rocks of varying sizes; fragments of charcoal; some bone, stone, shell, and antler artifacts; and the remains of two copper-covered wooden disks. The cultural remains from the ossuary exhibited a close similarity to materials from sites of the Upper Republican aspect in the area and were assigned by Strong to the Lost Creek focus of that aspect (Strong, 1935, pp. 103–114).

One additional site of a similar nature in the area, the Alma Ossuary (25HN2), was excavated during the summer of 1931 by A. T. Hill and reported by Strong. The situation at this site, with its disarticulated human remains, is reported to have been comparable to that at the Graham site. A comparison of the artifacts from the two sites indicated a very close similarity (Strong, 1935, pp. 122–123).

A somewhat different type of prehistoric ossuary examined by Strong was the Marshall site (25HN1), located on a point of the river bluffs 3 miles west and 2 miles north of the Graham site. Although the area had been badly disturbed by local collectors, Strong was able to find and excavate some small undisturbed areas. Disarticulated human bones, many of them broken and some burned, were associated in three areas or pits with an abundance of shell disk beads and blanks. These pits were round or oval in outline and in each case were sunk at least a foot into the hard undisturbed soil at the bottom of the deposit. Some charcoal occurred in the fill, and many of the beads were calcined.

Shell disk beads were the predominating type of artifact recovered from the site; all of them appeared to have been made from the shells of fresh-water bivalves. They included finished beads, others perforated but not ground on the edges, and rough unperforated blanks. Other artifacts included two broken triangles of thin shell, with holes bored in two corners; a small bead with two intersecting perforations, one bored lengthwise and the other at right angles to it; and a fresh-water pearl with a single perforation. The only bone artifact was a broken and calcined object which Strong suggested may have been the head of an awl. Pottery, worked stone, copper, and marine shells appeared to be absent (Strong, 1935, pp. 116–122).

Another burial site, Holdrege 5 (25FR9), was investigated during the summer of 1934 by the Nebraska State Historical Society. It is located on the left bank of Rebecca Creek about 2 miles south of the Republican River in Franklin County. Like the Marshall site, it consisted of a group of small pits which yielded broken and disarticulated human remains, with which were associated nearly a thousand shell disk beads and blanks. Broken shell pendants of triangular form and a type reported to be similar to the "bear claw" form described by Wedel (1935, pp. 203–204) were found. The latter type is represented only by fragments which also suggest a crescent form of pendant.

Burial grounds similar in character to the Marshall and Holdrege 5 sites appear to occur rather commonly throughout the upper Republican drainage, both on the Republican River and on its tributaries. These sites, which are characterized by an abundance of finished shell disk beads and a large number of blanks, have for the most part yielded few diagnostic artifacts which would aid in assigning the associated burials to a cultural complex. A general relationship between sites such as the Marshall Ossuary and those such as the Graham Ossuary is suggested by the fact that in both instances there is reinterment of the mixed bones of the dead with offerings, and by the occurrence of some shell disk beads in the sites, like the Graham Ossuary, which also yield pottery. There is, however, considerable difference between the types of artifacts from the shell bead ossuaries containing thousands of blanks and those from the ossuaries which contain pottery of Upper Republican types and a few finished shell disk beads. Only those ossuaries containing Upper Republican pottery were assigned by Strong to the Upper Republican aspect. The characteristic shell bead ossuary was placed in an unclassified category (Strong, 1935, p. 246).

DESCRIPTION OF WOODRUFF OSSUARY (Site 14PH4)

As it nears the Nebraska line in the vicinity of Woodruff, Kans., Prairie Dog Creek has a meandering course in a general northeast direction to its junction with the Republican River, some 12 miles distant in Harlan County, Nebr. The valley here has a width of nearly a mile, and numerous small tributary streams flow from the south across broad, level terraces. Little timber is present on the terraces and slopes, but the immediate banks of the stream support a dense growth.

The present stream channel is near the left valley slope where it is cutting into numerous spurs extending from the general terrace surfaces. It is on the point of such a terrace that site 14PH4 is situated (pl. 16, *a*). At its south edge, the terrace drops some 30 feet to the channel of Prairie Dog Creek, while to the west and east, the slope is less abrupt to rather narrow but level flood plains, subject to inundation during periods of high water. The general terrace level continues for more than a half mile to the north, where a transition to the uplands is effected by means of a long gradual slope. Erosion is accelerated on this slope by cultivation, so that considerable soil has been deposited on the terrace surface below.

The Nebraska-Kansas State boundary line crosses the north edge of the site less than one hundred yards north of the ossuary. The field in which the site lies was in native grasses some 40 years ago, but since that time it has been under cultivation, with corn the principal crop. Less than a half mile to the east the stream has shortened its course by cutting off an ox bow, which tends to be swampy during periods of excessive rainfall. The general terrace level, with an elevation of 2,000 feet, is well above the limit of flooding and only the north edge would be subject to wash from the higher hills above.

Although several archeological sites in the Prairie Dog Valley were known locally, none were recorded by research institutions above the mouth of the stream prior to investigations by the River Basin Surveys during the summer of 1946. At least one occupational site, 14PH5, which is situated less than a half mile east of 14PH4, had received some attention from residents of the locality. This site appears to be assignable to a variant of the Upper Republican aspect. Although some surface materials have probably been collected at 14PH4, there was no report or evidence of digging by local people.

The site was first recorded during the course of a brief preliminary archeological reconnaissance of the proposed Harlan County Reservoir area during the month of August 1946 by the River Basin Surveys. Limited tests in a surface concentration revealed dark soil containing charcoal, human bones, shell disk beads, and mussel-shell fragments to a depth of more than 4 feet over an area approximately 20 feet in diameter. Although surface examination revealed an area of darker soil and a concentration of cultural materials, there was no evidence of a mound or depression. Such features, if present, may have been obliterated by 40 years of cultivation.

During the period October 17 to November 11, 1946, an intensive investigation of site 14PH4 was undertaken by the River Basin Surveys. After additional tests had indicated that the most promising location for excavation lay at the southwest edge of the terrace, the area was laid out in 5-foot squares. A north-south base line was established, starting 25 feet south of the area of dark soil and continuing north beyond its apparent limits for a total distance of 60 feet. The south end of the line was designated "N zero." At intervals of 5 feet from the "N zero" stake, the line extending north was set off by stakes and numbered consecutively in 5-foot units preceded by the letter N; thus square "N25" would have its southeast corner 25 feet north of the "N zero" stake. These points served to designate the 5-foot squares west of the line and each square was designated by the number on the stake in its southeast corner. Sections in the first row of 5-foot squares west and east of the base line were designated by the N series of numbers to which were added W1, W2, W3, and E1, E2, E3, respectively, depending on the location of the southeast corner 5, 10, 15, or more feet west or east of the base line. Thus, the southeast corner of a square designated N35 E2 would lie 35 feet north and 10 feet east of the "N zero" point. Similarly, the southeast corner of square N25 W3 lies 25 feet north and 15 feet west of the "N zero" stake.

Within each 5-foot square the soil was troweled out in 12-inch levels to within 2 inches of the outer limits of the square. This 2-inch section was left standing and, together with the 2-inch section from the adjacent square, produced a central block 4 inches wide. Disarticulated bones and scattered shell beads and blanks, which were relatively abundant, were sacked according to the 12-inch level in which they occurred. Less common materials, such as concentrations of human bone, stone and bone artifacts, sherds, and significant shell artifacts, were sacked separately with exact horizontal and vertical provenience recorded.

The total area excavated measured slightly more than 500 square feet, and varied in depth from 12 inches at the outer edges of the excavation to slightly more than 6 feet in the deeper sections. Profiles were drawn and photographs were taken of the 4-inch control sections left at the edges of the squares. Prior to any deeper excavation of any squares, the entire area of discoloration was cleared of soil disturbed by cultivation. This loose soil, which varied in depth from 6 to 8 inches, contained a quantity of human bone fragments, broken mussel shells, and shell disk beads, as well as partially decayed corn stalks. The general outlines of a roughly oval area of dark soil, which were then discernible, were photographed and mapped (pl. 16, *b*).

TABLE 1.—*Summary of dimensions and contents of pits at site 14PH4*

Feature No.	Location: Square	Depth		Diameter	Contents
		From ground surface	Into subsoil		
		Inches	*Inches*	*Inches*	
1	Under stake N30 W1.	36	0	36 N-S x 38 E-W	Charcoal, flint chips, burnt earth, bone fragments, two pottery sherds, one tubular bone bead, perforated and blank shell disk beads.
6	N35 E1 and N40 E1.	56	18	60 N-S x 40 E-W	Charcoal and burnt earth; ribs; vertebrae: fragments of human long bones; flint chips; shell disk beads, some calcined, concentrated in bottom of pit; one worked antler section.
7	N35 and N35 W1	34	12	38 N-S x 24 E-W	Disarticulated human adolescent bones, shell disk beads in lower 12 inches of pit, charcoal and burnt earth.
9	N30 E1	65	23	32 N-S x 34 E-W	Disarticulated human bones, adult and adolescent; charcoal; burnt earth; concentration of shell disk beads in lower 12 inches of pit.
12	N30 and N35	60	12	20 N-S x 36 E-W	Disarticulated human bones, charcoal, burnt earth, shell disk beads, broken projectile point, bone beads, shaft wrench.
14	N25 E2 and N30 E2.	64	14	27 N-S x 20 E-W	Disarticulated human bones, charcoal, burnt earth, shell beads, flint chips, one pottery sherd at depth of 54 inches, one projectile point.
15	N20 E1, N25 E1, N20, and N25.	60	48	36 N-S x 48 E-W	Disarticulated human bones, charcoal, burnt earth, shell beads, two antler tools, worked flint, tubular bone beads, one pottery sherd.
20	N45 E2 and N45 E1.	70	22	30 N-S x 39 E-W	Disarticulated human bones, charcoal, burnt earth, shell beads.
22	N35 E2 and N40 E2.	74	26	60 N-S x 36 E-W	Disarticulated human bones, charcoal, burnt earth, shell disk beads.
23	N35 E1 and N35 E2.	76	18	18 N-S x 16 E-W	Human bone fragments, charcoal, burnt earth, shell disk beads.
25	N25 E2	42	12	25 N-S x 26 E-W	Disarticulated human bones, charcoal, worked shell.
26	N25	58	12	42 N-S x 47 E-W	Disarticulated human bones, charcoal, burnt earth, shell disk beads.
27	N30 E2 and N30 E4.	56	14	30 N-S x 36 E-W	Disarticulated human bones, charcoal, burnt earth, shell pendant, shell disk beads.
28	N35 E2 and N35 E3.	52	20	30 N-S x 28 E-W	Disarticulated human bones, charred timber, shell disk beads, burnt earth.

Initial excavations were made in square N25 at the southwest edge of the discoloration and in square N40 at the northwest edge. The removal of the mixed soil in these two sections revealed undisturbed loess in the west side of square N40 and in the southwest corner of square N25. A similar system of excavation was extended throughout the area of discoloration (pl. 17, *a*). Upon the removal of all disturbed soil, the limits of an oval basin were discernible (fig. 2). The presence of some individual pits which occurred beneath the basin was suggested by a greater concentration of human bones and shell beads traceable from the surface to the bottom of several pits (pl. 17, *b*). The exact limits of the majority of the pits could not be determined, however, except where the bottoms extended some distance into the yellow loess soil below the general area of mixture. The depth to which these pits penetrated into the subsoil varied considerably and it is possible there were other pits which did not extend into the yellow sterile soil and were not discerned. The walls of several pits which intersected the large basin and extended beyond its general limits were discernible just below plow level. Cultural materials from individual pits below the basin level were segregated by levels and sacked separately. Feature 15 (table 1), an oval pit, was located outside the limits of the large basin at the southwest edge (pl. 18, *a;* fig. 2). Tests around the edge of the basin, as well as elsewhere on the terrace, failed to reveal other disturbed areas.

With the exception of one skeleton (Feature 21), all of the burials were secondary. A second burial (Feature 16) exhibited some articulation, but certain of the bones were missing (pl. 18, *b*). In other isolated instances, lower arm and hand bones, vertebrae, and bones of the foot were articulated (pl. 19, *a*).

Skulls were few in number and were in most cases in a poor state of preservation, so they were of little aid in determining the total number of individuals present. A count of individual bones indicates that some remains of at least 61 individuals were placed in the basin and pits, and it seems likely that the total number was somewhat greater. Some remains were evidently destroyed during the last 40 years by cultivation, while others may have decayed.

With the exception of the one fully articulated individual and a partially articulated burial, all of the bones appeared to have been deposited in a haphazard manner; there was no evidence of bundle burials (pl. 19, *b*). Many of the bones were broken and some were burned. Calcined shell disk beads, blanks, and mussel shells were common, and several bone artifacts show evidence of fire. Skeletal remains represent individuals of various ages from infants to old adults.

Bones of the single flesh burial, an adolescent, were well preserved and showed no evidence of fire (pl. 20, *a*). This may be accounted for by its greater depth on the floor of the basin in square N25 E1, 35 inches below the surface. The skeleton was semiflexed, and lay on the left side facing to the west, with the skull to the south. Extending around the skeleton in the pelvic area were rows of shell disk beads in alinement. Other rows of beads extended up the chest and around the neck. Many of the rows were of well-ground and evenly matched beads, while others included bead blanks that had been perforated and evidently strung but had not received the final smoothing which characterizes a finished bead. Triangular shell pendants occurred on both the upper and lower sides of the skeleton, particularly in the vicinity of the skull (pl. 20, *b*). Specimens associated with this burial, other than the abundant fresh-water shell disk beads, include worked sections of marine shells and one bone implement. This implement, which projected from beneath the distal end of the left humerus, is fashioned from the tibia of a deer. It is perforated near the proximal end and suggests a shaft-wrench type of tool or possibly a digging stick handle.

The general outline of the basin was symmetrical except where it was interrupted by smaller pits. The slope of its walls was rather steep on the north but more gradual on the other three sides. Although charcoal fragments—some of which appear to be elm—ranging up to 6 inches in diameter were common, there was no evidence of post molds. Charred timber sections lying horizontal were common through the basin and most of the pits, but small charred twigs and branches were more common in the lower sections of these features (fig. 3). Some areas of burnt earth occurred in the upper portions of the basin fill where the charcoal fragments were most plentiful, but there was no evidence of prepared hearths or prolonged burning. The calcined condition of the bones and artifacts appeared to have resulted from burning within the basin with no indication of planned cremation.

Many disarticulated human bones were scattered throughout the burial area (pl. 21, *a*). These apparently represent secondary burials with which shell disk beads, ornaments, and other artifacts may have been associated originally. The majority of the human remains are well preserved; others are in a fragile condition which may have resulted from exposure of the corpse on scaffolds or in trees. After decomposition of the flesh, the scattered beads and weathered bones were presumably gathered up and deposited in the various pits. Other bones which show little evidence of exposure may have been exhumed from graves elsewhere and brought to a central burial pit for final interment. The single articulated skeleton lying on the floor of the basin may represent an individual who was placed directly in the community burial area without undergoing exposure or previous separate interment. The abundance of shell beads and other artifacts scattered throughout the basin fill suggest that other corpses may at one time have been comparatively well adorned.

The occurrence of some bones in their natural alinement resulted from sufficient tissue remaining on the bones at the time they were placed in the pit to maintain their articulation. The rather numerous occurrences of from 3 to 20 evenly matched beads in close alinement probably indicates that a majority of the beads were originally in strings like those with Feature 21 and were disarranged during the subsequent period of exposure and reinterment. The unperforated shell bead blanks, which could not have been strung, may have been scattered over the various individual burials or placed in bags.[2] There is some indication at the Woodruff Ossuary, as well as at other sites of a similar nature, such as Guide Rock (25WT3), that a majority of the shell ornaments were associated with infants and adolescents.

ARTIFACTS

Strong has emphasized the absence of pottery and artifacts of material other than fresh-water shells in the Marshall Ossuary. "It [the Marshall Ossuary] was truly a 'shell bead burial' and therefore different from the Graham Ossuary, both in content and structure" (Strong, 1935, p. 121).

The Woodruff Ossuary was apparently similar in construction and content to the Marshall Ossuary with its predominance of shell artifacts; in particular, both contained bead blanks as well as finished shell disk beads. The Woodruff excavation, however, yielded a greater variety of artifacts. These include pottery sherds; artifacts of stone, bone, and antler; and objects fashioned from both fresh-water and marine shells. Artifacts occurred throughout both the large basin and the smaller pits.

POTTERY

The rather scanty pottery remains occurred at various depths in the general basin fill, as well as in the individual pits. The sherds, which are all from the bodies of vessels, are uniform in appearance and appear to represent a single pottery type (pl. 21, *b*). They consist of 10 sherds which vary in diameter from 7 to 50 mm. There is sufficient variation in the characteristics of the sherds to suggest that more than one vessel is represented.

Tempering in all of the sherds includes crushed calcite, used rather abundantly. There is a limited amount of limestone in two of the sherds; sand, grit, and other aplastics do not appear to be present. Calcite crystals are found in various shales which are exposed along the Republican River and can be freely extracted on the weathered

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[2] A burial custom which may be comparable in some respects to that represented by the remains at 14PH4 is described for the Huron Tribe by Jean de Breboeuf in the year 1636 (Kenton, 1927, pp. 297–308).

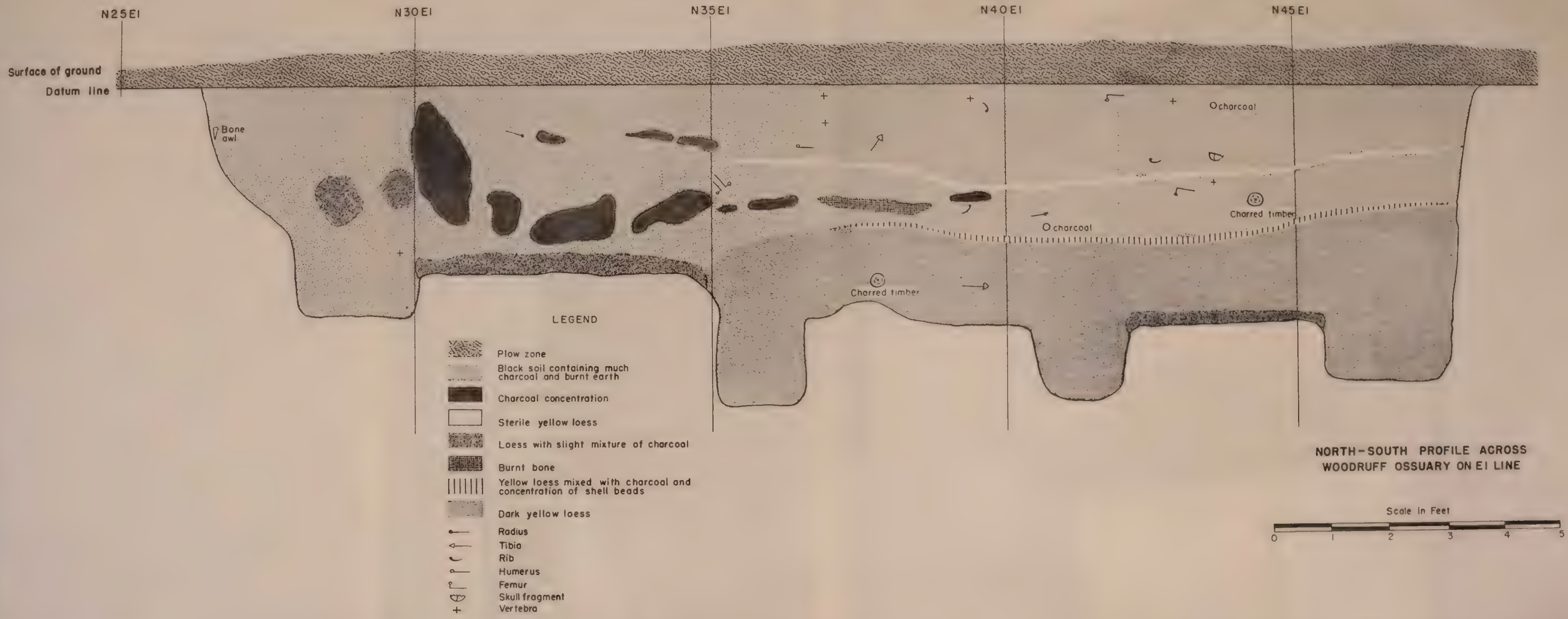
N25E1
N30E1
N35E1
N40E1
N45E1
Surface of ground
Datum line
Bone awl
Ocharcoal
Charred timber
O charcoal
Charred timber
LEGEND
Plow zone
Black soil containing much charcoal and burnt earth
Charcoal concentration
Sterile yellow loess
Loess with slight mixture of charcoal
Burnt bone
Yellow loess mixed with charcoal and concentration of shell beads
Dark yellow loess
Radius
Tibia
Rib
Humerus
Femur
Skull fragment
Vertebra
NORTH-SOUTH PROFILE ACROSS WOODRUFF OSSUARY ON E1 LINE
Scale in Feet
0
1
2
3
4
5

FIGURE 3.—North-south profile across Woodruff Ossuary on E1 line.

slopes. There may be other sources in the immediate vicinity. The calcite inclusions range in size from fine (less than 0.25 mm. diam.) to very coarse (over 7 mm. diam.), with most falling between 1 and 3 mm. The paste is buff to dark gray in color. The interior surface of the sherds has a thick carbon coating which may be scratched off easily. When viewed in cross section, approximately one-fourth of the sherds' thickness adjacent to the interior surface is black. Freshly broken surfaces are very irregular and have a granular appearance with a tendency to shatter. Hardness ranges from 3 (calcite) to 4.5 (chabazite), with 6 of the sherds about 3.5 (celestite). Thickness ranges from 9 to 13 mm., with 7 sherds having thicknesses of 11 to 13 mm. The exterior surfaces of all the sherds are cord-roughened. The cord marks are medium fine to coarse and lie parallel; impressions of individual twisted cords are visible in several instances. Although the soot-encrusted interior surfaces are difficult to observe, they appear to have been smoothed. There is no evidence of decorations, handles, or other appendages. The few body sherds, all of which are small, give no indication as to vessel shapes.

WORK IN ANTLER AND BONE

Artifacts of bone and antler, although not common at the site, were rather well preserved. There are 8 specimens of antler which appear to represent two types of tools. Five of the implements, one incomplete, are made from the proximal end of the antler with a remnant of the "burr" evident as a slight swelling at one end (pl. 22, *a*, 5). The length of the antler sections varies from 47 to 75 mm. The original rough surface has been retained on the sides, but the ends are rounded and moderately smoothed. The distal end of one specimen has a roughly circular cavity with a diameter of 11 mm. and a depth of 19 mm. The specimen is in a fragile condition and it cannot be determined whether the cavity is the result of decay or is due to modification by human agency. These implements are somewhat suggestive of the antler tapping tools or "cylinders" of the Upper Republican and other Central Plains aspects (Cooper, 1936, pl. 20, 1–3). In general, however, the length of the specimens from 14PH4 is considerably less and the specimens are less carefully finished. Similar objects have been described as "drifts" for working stone (Webb, 1939, p. 32, pl. 13, *b*).

Three antler tines were also recovered from the excavation (pl. 22, *a*, 4). The proximal ends of all three are roughly finished. The distal ends of two are scarred and nicked in a manner which suggests their use in pressure flaking; one is worn diagonally to a chisel point while the other has a rather blunt tip. The distal end of the other specimen is lacking. The sides of all three sections are smoothed and moderately polished. The specimens vary in length from 72 to 80 mm., and the greatest diameter, at the base, varies from 18 to 24 mm.

Tubular bone beads are represented by 28 specimens, 9 of which came from the floor of Feature 12, a pit (pl. 24, 3). The remainder were found at various levels throughout the excavation. All but one are small and well made; they were probably fashioned from small bird bones. Their lengths range from 9 to 14 mm. and the diameters vary from 3 to 6 mm. Characteristically, they have a circular cross section throughout. The nature of two of the beads which are not finished on the ends indicates that the small bone was cut part way through and then snapped off. Subsequent polishing has eliminated evidence of this process on most of the beads. A somewhat larger type of tubular bone bead is represented by a single calcined specimen (pl. 24, 4), which is slightly curved longitudinally. It is 30 mm. long and has a diameter of 11 mm. Its ends are smoothed and rounded and its sides appear to have been well polished prior to burning. None of the beads are incised or otherwise decorated.

Bone awls are represented by a single incomplete specimen (pl. 22, *a*, 3). Its original length cannot be determined, but a considerable section of the base appears to be missing. The surface of the break is rough and unpolished, and shows no evidence of use subsequent to fracturing. The present length is 16 cm. and the greatest width, near the break, is 18 mm. The specimen appears to have been fashioned from the split metapodial of a deer. The point has been rounded and polished, while the shaft retains the original exterior contour of the bone. The cancellous tissue has been removed from the interior.

From a depth of 14 inches in square N35 E1 came a deer metapodial from which the distal end has been removed by cutting and breaking (pl. 22, *a*, 1). A circular hole 9 mm. in diameter appears to have been made near the center of the proximal articular surface and the cancellous tissue has been removed so that a cavity extends the length of the specimen. The exterior surface appears to be otherwise unmodified. The specimen has a length of 19 cm. Whether it had a function in its present condition or was in the process of being fashioned into a tool is not known. Bones similarly treated, except for the hole in the articular surface of the proximal end, are found in sites attributable to the Upper Republican aspect and appear to represent a stage in the making of awls (Wedel, 1935, p. 200).

Beneath the lower left arm of the articulated burial (Feature 21) in section N25 E1 was an implement made from the metapodial of a deer (pl. 22, *a*, 2). A second very similar implement was found at a depth of 39 inches in Feature 12, a pit. A calcined fragment of a third specimen of this type lay surrounded by burnt earth and charcoal in section N30 E1, at a depth of 24 inches. The distal ends of the two specimens which appear to be complete have been removed, apparently by breaking, as the end, although well polished, is uneven. The proximal end of the specimen excavated from Feature 12 has been partially removed and the end has then been rounded. At a distance of 19 mm. from the modified proximal end of this specimen is an oval hole which averages 14 mm. by 10 mm. in diameter. Opposite edges of the greater diameter are slightly beveled. One complete specimen, associated with Feature 21, has a length of 13.5 cm. while the other has a length of 11.6 cm. There are two shallow incised intersecting lines near the end opposite the perforation. The calcined fragment, which consists of the proximal end extending approximately halfway through the perforation, appears to have been similar to the other two. Three short parallel diagonal lines have been incised on one side in the vicinity of the perforation. The two complete specimens are highly polished on the sides and the cancellous tissue appears to have been removed from the interior of the bone. These objects are similar to the so-called shaft wrenches which occur in nearly every Central Plains complex. They are more commonly made from rib bones of large mammals, but specimens made from leg bones of cervids do occur in the Upper Republican aspect. Whether these specimens served a function similar to those made of ribs is not known.

Various burnt animal bone fragments which appear to have been cut or polished were found. At least one such fragment, which may be from the scapula of a rather large animal, is well smoothed and polished. Its original use cannot be determined. Large numbers of rabbit teeth occurred scattered near Feature 16. They were unmodified and their purpose is unknown.

WORK IN STONE

Artifacts of chipped stone were not abundant at the site, but they represent considerable variety. Jasper appears to have been utilized to the near exclusion of other materials for making various chipped stone artifacts. This material outcrops locally in the Republican drainage and occurs in various shades of yellow, brown, red, and gray. A few chalcedonic flakes have surfaces suggestive of water polishing and may have been picked up as stream pebbles and utilized. Dark red quartzite was used for making one specimen.

A total of five projectile points sufficiently complete to permit classification came from the excavation (pl. 23, *a*, 3). The original form of four broken points cannot be determined. Two of the larger points exhibit relatively coarse flake scars on the flat surfaces but the edges are finely chipped. The three smaller specimens show rather fine over-all chipping. In quality of workmanship, the smaller points equal the finely chipped triangular, side-notched points of the Upper Republican aspect. The edges of one broken point are rather finely serrated. In cross section the blades of all points are double-convex with the greatest thickness (3–7 mm.) along the midline.

On the basis of form,[3] the five projectile points appear to represent three types, all variants of a stemmed form. All have expanding stems and are shouldered and barbed. Three have convex bases (SCb1), one has a straight base (SCb2), and one has a concave base (SCb3). The three with convex bases vary in length from 21 to 26 mm. and in width from 13 to 15 mm. One of the other two specimens (SCb2) has a length of 48 mm. and a width of 38 mm., while the length of the other (SCb3) is 55 mm. and the width, 31 mm.

Six crudely chipped specimens which appear to fall into one class came from various levels throughout the excavation and may be classified as celts (pl. 23, *b*, 2). All are made of yellow to dark brown jasper and are roughly triangular in shape. The bit at the widest end is rounding and has been thinned by secondary chipping. The poll is less well shaped and may be either rounding or slightly pointed. A lime matrix, which probably represents the surface of the original jasper slab, is present on one lateral surface, and sometimes on both. The specimens vary in length from 5.9 to 8.2 cm.; the greatest width, which is just above the bit, varies from 3.8 to 5.2 cm. Maximum thickness is in the vicinity of the greatest width and varies from 1.5 to 2 cm. These specimens are very similar to the chipped celts from the Upper Republican aspect, but as a series average much smaller.

There are 35 rough flakes with one or more retouched edges (pl. 23, *a*, 2). They exhibit no uniformity in shape and appear to be hastily improvised implements. The retouched edges on many are very fine, while on others they are coarse. They may have had a scraping or cutting function.

Six end scrapers, one of which came from the surface, are of the plano-convex type (pl. 23, *a*, 1). They vary to some extent in shape but common to all is a plane or slightly curved ventral surface. The smallest is 27 mm. by 24 mm., while the largest is 54 mm. by 31 mm. They do not appear to differ significantly from specimens occurring in nearly every Central Plains archeological complex.

A few broken, roughly chipped sections, worked on both faces and double-convex in cross section, may be knife fragments. A rounding end is suggested by two fragments. Two complete specimens have lengths of 45 and 38 mm. and widths of 25 and 28 mm. The broken sections appear to be from specimens of somewhat greater size. Similar specimens were found at 25VY1 (Hill and Kivett, 1941, p. 172).

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[3] After Strong, 1935.

A brown jasper slab measuring 13 cm. by 6 cm. by 2.5 cm. is roughly flaked and may represent raw material in the form in which it was brought from the quarry or stream bed. A lime matrix visible on three sides indicates the thickness of the original seam.

Three stream-polished quartz pebbles show evidence of use as pecking or hammer stones (pl. 23, *b*, 1). They do not appear to have been intentionally shaped but have been slightly modified by use. One, from the surface, is roughly rectangular in shape and has its two opposite ends rounded through use. It has a length of 6.5 cm. and a width of 3.4 cm. The other two specimens, which were excavated, are somewhat round in outline. One shows evidence of battering on only one end but the other has been used on all edges. The larger has a diameter of 8.2 cm. and a thickness of 4.5 cm., while the other has a diameter of 6 cm. and a thickness of 4 cm.

WORK IN SHELL

Artifacts of shell were very abundant on the surface as well as throughout the excavation. The majority of the thousands of specimens are fashioned from fresh-water mussels, but some were made from marine forms.

Disk beads and blanks of shell representing all stages of manufacture were extremely abundant throughout the excavation. Groups of as many as 30 evenly matched, ground and perforated beads were found in alinement just as the strings of beads were presumably thrown into the pit. The single complete articulated skeleton appears to have been wrapped in the pelvic area and up the chest with strings of beads. All the beads and blanks have been bored but many are not ground down. The unfinished beads appear to have been strung separately from the ground and finished specimens. A few unbored and unground blanks were scattered above the lines of beads (pl. 22, *b*, 1). Many of the individual strings contained more than a hundred beads. The process of making the beads appears to have been as follows: The mussel shells were broken into sections which were then ground or broken into a roughly circular shape. The blanks were then drilled from the interior surface and the outer surface was smoothed and flattened to enlarge the drill hole (pl. 22, *b*, 2.). They were probably then strung before they were ground and polished to their final matched form (pl. 22, *b*, 3). Strong (1935, p. 120) has suggested this method for almost identical specimens from the Marshall site. He describes the process as follows:

> Apparently, the shells of a fresh-water bivalve were broken up, ground approximately round on sandstone or broken to shape, bored, strung on some stiff wood fiber, and then rolled on a slab or between two slabs until perfectly smooth and round. This is the method employed by the Pomo and

> other California tribes, and the same sequence is suggested by the complete series from the present [Marshall] site.

Although some of the thicker finished beads from 14PH4 have been drilled from both sides, the majority, like those from the Marshall site, were drilled only from the interior side. There is considerable variation in the size of the finished beads (pl. 22, *b*, 3). They range in diameter from 6 mm. to 18 mm., with the majority being not more than 9 mm. across. The holes are usually well centered but in some cases they are very near the edge, particularly on those specimens which are ground down to a diameter of 7 mm. or less.

There are 9 nearly complete crescent-shaped pendants with a perforation at each end for suspension and fragments which appear to represent 14 additional specimens of the same type (pl. 25; 11). They are cut from the ventral margin of fresh-water bivalves along the pallial line. Their length appears to have been determined by the size of the shell. The outer curved surface follows the ventral margin of the shell, while on the inner edge the shell has been cut along the pallial line. Three complete specimens which were found associated are of graduating sizes and suggest that several may have been worn together. They vary in length from 6.2 cm. to 12.5 cm. The maximum width, taken near the midpoint, varies from 1.2 cm. to 1.5 cm. The specimens taper to a rounded point at each end. Several were redrilled at the ends after the original perforations for attachment wore through or were broken. The edges of all specimens have been smoothed and polished to a rounded surface, but the sides show little modification. Perforations vary in diameter from 2 to 4 mm.; they appear usually to have been drilled from the interior surface of the shell.

A second type of pendant is represented by a single specimen which came from square N40 E1 at a depth of 42 inches. This object was fashioned from a fresh-water mussel shell and is subrectangular in shape with rounding corners (pl. 25; 1). A hole drilled from the interior is located near each of two corners. The shell has been cut longitudinally so that the upper margin of the gorget was originally near the center of the shell and the lower margin retains the pallial line and ventral margin. The edges are well rounded and smoothed. The specimen has a length of 9.5 cm. and a width of 4 cm. A similar object has been reported by Strong (1935, p. 115) from an unassigned burial near the mouth of Prairie Dog Creek, in Harlan County, Nebr. Two similar pendants were also recovered, during River Basin Survey's excavations in 1948, from a burial assignable to the Keith focus (Woodland) in the Medicine Creek Reservoir area in Frontier County, Nebr. (Kivett, 1949, fig. 69, 1, *c*).

Near the mouth of a partially articulated skeleton (Feature 16) in square N30, at a depth of 46 inches, was found a cut shell fragment which may represent an incomplete pendant or gorget (pl. 25; 10). This appears to have been worked from some heavy shell, probably a marine form such as a Gulf Coast conch. It is roughly triangular in shape and curved longitudinally. One edge is cut to a bevel, while the other edges are rounded and smoothed. There are no perforations for attachment. The length of the specimen is 9.5 cm., the width at the base of the triangle is 3.6 cm., and the greatest thickness near the apex is 4 mm. It is stained a rusty brown and is somewhat chalky and weathered.

Seven triangular pendants fashioned from fresh-water bivalves came from various levels throughout the excavation (pl. 25; 2, 3, 4). Four were found near the skull of Feature 21. The majority approximate the shape of an isosceles triangle, with the base 4 to 10 cm. longer than the sides. Perforations in each of two corners have been drilled from the interior and vary in diameter from 3 to 7 mm. Bases vary in length from 4.2 to 7.6 cm., while the sides vary from 3 to 6.4 cm. Edges are well rounded and smoothed.

Two specimens are somewhat similar to the triangular, biperforate pendants described above but tend toward a crescentic shape (pl. 25; 5, 6). The edge between the two perforations is concave while the opposite edge curves to a rounding point. One specimen has a length of 4.3 cm. and a width of 2.1 cm.; the other has a length of 4.6 cm. and a width of 2.3 cm. Both are broken at the perforations, which are estimated to have been 3 mm. in diameter.

A section from the stem of a Gulf of Mexico conch shell, *Busycon contrarium* (Conrad),[4] has been drilled longitudinally from both ends to form a tubular bead or pendant (pl. 25; 7). The exterior surface has been rounded and smoothed, but the spiral of the stem is still discernible. It has a length of 5.5 cm. and a diameter of 1.7 cm. The perforation narrows from a diameter of 7 mm. at one end to approximately 3 mm. near the midpoint, then widens again to 5 mm. at the other end. This specimen was found near the right mastoid process of Feature 21, the single flesh burial.

Two irregular fragments of chalky shell also appear to be from marine forms (pl. 25; 8, 9). One is roughly rectangular in shape, rounded on one end, and is well polished. The opposite end is uneven and has been broken. The second specimen appears to have been weathered and shows little polish. It is roughly oval in shape, and has a circular perforation 4 mm. in diameter near one rounded and smoothed end. The original shape or purpose of these two specimens cannot be determined; presumably they were for decoration.

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[4] Identified by Dr. J. P. E. Morrison, Associate Curator, Division of Mollusks, U. S. National Museum, Smithsonian Institution.

Scattered throughout the ossuary were 21 olivella (*Olivella sp.*, probably *nivea* Gmelin)[5] shells with the spire removed and a hole bored in line with the natural opening; the cut end is well rounded and smoothed. They vary in length from 11 to 15 mm. Several have pitted and eroded surfaces, while others are well preserved (pl. 24; 2). This type of bead was reported by Strong (1935, p. 113) from the Graham Ossuary, and unworked shells of the same species are reported from an Upper Republican village site (Strong, 1935, p. 101).

A total of 12 beads fashioned from the stems of marine shells, probably *Busycon contrarium* (Conrad) from the Gulf of Mexico, were recovered (pl. 24; 5). They vary from subrectangular to slightly triangular in cross section. They are drilled lengthwise and have rounded and smoothed ends. Length ranges from 18 to 30 mm., diameter from 14 to 24 mm. Although the majority are pitted and have little luster, the lowermost side of one is smooth and well preserved.

One rather unusual type of bead, which appears to have been fashioned from fresh-water mussel shells, is represented by eight specimens (pl. 24; 1). These are rounded in cross section but have one side ground to a flattened surface. The ends are flattened to rounding. A hole has been drilled into the flattened surface to intersect at right angles another perforation bored lengthwise from one end. The specimens have an average length of 11 mm. and a diameter of 6 mm. at the widest point, which is near the center. The diameters of the perforations average 3 mm. and narrow to an average of 1 mm. at the junctions of the intersecting perforations. A single example of this type of bead is reported by Strong (1935, p. 120) from the Marshall Ossuary.

RÉSUMÉ

In the foregoing pages, the results of excavation and of laboratory analysis of material from a prehistoric burial site, 14PH4, in northern Kansas, have been presented. Though the data leave many questions unanswered, they are important for the new light they throw on certain little-known burial complexes in the Central Plains.

Present information suggests that burial sites of this type, generally characterized as "shell-bead ossuaries," center in the Republican River drainage in south-central Nebraska. Thus far, such sites have not been investigated east of Adams County or west of Harlan County in Nebraska.

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[5] Identified by Dr. Harald A. Rehder, Curator, Division of Mollusks, U. S. National Museum, Smithsonian Institution.

There are unconfirmed reports, however, that they may extend well into Kansas to the south and perhaps to the east in the Nemaha and Blue River drainages.

The majority of the remains at 14PH4 were secondary burials which appeared to have been deposited with little regard for orderly arrangement. Although there appeared to be a concentration of materials above some pits in the floor of the larger basin, it is suggested that the various individual pits which occurred both inside and outside of the basin may have been excavated prior to the basin. At a later time an oval basin was excavated, removing the upper portions of many of the earlier individual pits. There can be little doubt that a basin was intentionally excavated at 14PH4, although Strong (1935, p. 121) was of the opinion that the mixed area above the pits at the Marshall site (25HN1) resulted from the intersecting of the pits. The bottoms of several deeper pits were discernible below the floor of the basin. Other pit walls extended beyond the limits of the basin. A single pit (Feature 15), which showed as a darker area just below the plow line, was located and excavated and found to lie entirely outside the basin. Human remains in this pit were disarticulated and scattered, and differed little from the general arrangement within the basin. It is not clear whether these pits served as primary depositories for remains which were later exhumed and placed in the basin or whether they served some other function. Wedel does not report a basin such as this at Holdrege 5 and perhaps this additional feature was not always constructed.

Although there were no definite hearth areas, considerable burning had occurred in the basin, and various layers of charred timbers and twigs appear to have separated the human remains. Some human bones and many shell-disk beads were charred. A single articulated skeleton lay on the floor of the basin with a considerable number of artifacts, the majority fashioned from shell. Other objects of bone, shell, and stone were scattered throughout the basin.

Implements of hunting, and perhaps warfare, included small to large barbed and stemmed projectile points. Small chipped celts and retouched flakes were relatively common, and end scrapers which differ little from the usual type in the area were present. Cylindrical antler sections and antler tines, perhaps for working stone, occurred. Awls are represented by a single specimen, but it is likely that such implements were in common use.

Items of personal adornment or grave goods include the bulk of the specimens, with the greater emphasis on those fashioned from fresh-water and marine shells. Shell-disk beads in all stages of manufacture were present by the thousands. In general, they appear to differ little from those which occur in very limited quantities in nearly every archeological complex in the Central Plains. Their importance as a diagnostic trait appears to rest primarily on their relative abundance and on the presence of unfinished beads and blanks. Two distinct types of pendants made from the shells of fresh-water mussels, a triangular and a crescent form, are less common and have been reported only from shell-bead ossuaries. A rather unusual type of bead with two holes on the same plane, one bored lengthwise and the other at right angles, is also known only from burials of this type (pl. 24; 1). Beads, pendants, and sections cut from *Busycon* shell appear to differ considerably from those reported from sites such as the Graham Ossuary (25HN5).

Small tubular bone beads were relatively rare at this site but were common at Holdrege 5 and other sites which appear to be assignable to the same complex. Rabbit mandibles may have been perforated and worn for personal adornment, or the teeth may have been mounted on wood or other material for ornamentation. A single mandible of a badger found near a partially articulated burial was not modified and its purpose is unknown. Implements fashioned from deer leg bones may be comparable to the shaft wrench which occurs in many ceramic horizons throughout the Central Plains.

Pottery, although represented by only a few sherds, is important in suggesting cultural relationships. The sherds are relatively thick, cord-roughened over-all, tempered with crushed calcite, and granular in structure. Interiors are commonly soot-encrusted and the exterior color is gray to buff. Hardness averages around 3. Fabric or cord impressions do not occur on the interior surfaces of the limited number of sherds from 14PH4 but have been found on sherds from village components of the Keith focus, such as site 25FT18 in Frontier County, Nebr. (Kivett, 1949, p. 282, fig. 69, *c*). Thus far, the use of calcite appears to have important diagnostic value as a marker for this complex. It seems likely, however, that pottery of this type may be found with other aplastics, since calcite is not readily available in all sections of the Central Plains.

TABLE 2.—*Comparison of traits from site 14PH4 with those from other burial sites in the immediate area* [1]

Culture traits	Woodruff 14PH4	Guide Rock 25WT3	Graham 25HN5	Marshall 25HN1	Alma 25HN2	Orleans 25HN3	Flag Creek 25HN4	Robb 25WT4	Holdrege 5 25FR9	Dunn 25FR2	Illustrations
Location of site.											
Hilltop		+	+		+			+			
Slope							+				
Bluff point				+							
Bench or terrace	+					+			+	+	Pl. 16, *a*.
Oval to circular basin containing individual pits.	+	?		?		?	?	?		?	Pl. 18, *a*.
Oval to circular basin without individual pits.			+		+						Strong, 1935, fig. 10.
Individual pits, not in basin	+	+							+		Wedel 1935, pl. 4.
Type of burial:											
Extended											
Flexed									+		
Semiflexed	1	+									Pl. 20, *a*.
Bundle											
Disarticulated and scattered	+	+	+	+	+	+	+	+	+	+	Pl. 19, *a*.
Partially articulated	2	+	+	?		?		+		?	Pl. 18, *b*.
Evidence of some burning in pit or basin.	+	+		+		+	+	+	?	+	
Shell artifacts:											
Disk beads	[2] M	M	85	M	3	M	M	M	M	M	Pl. 22, *b*.
Bead blanks, perforated and unperforated.	M	M		M		M	M	M		M	Pl. 22, *b*.
Triangular pendants	7	24		2		1	?	6	+	?	Pl. 25, 2, 3, 4.
Crescent pendants	23	8		?		?	?	8	?	+	Pl. 25, 11.
Bear claw pendant			11		3						Strong, 1935, pl. 9, fig. 2 I-N.
Right-angle-perforated beads	6	6		1		2	?	2		+	Pl. 24, 1.
Conch beads	12	4									Pl. 24, 5.
Olivella beads	21	10	5	?		6	?	2			Pl. 24, 2.
Conch pendants	2		2								Pl. 25, 8, 9.
Cylindrical beads			9		5						Strong, 1935, pl. 11, fig. 2, E.
Gastropod beads		6	16		+			2		+	Strong, 1935, pl. 11, fig. 2, *f*.
Conch sections	1		+		2	?	?			+	Pl. 25, 10.
Chipped stone artifacts:											
Small celts	6	1		+		+	+	1		2	Pl. 23, *b*, 2.
Retouched flakes	35	+	+		?	+		+	+		Pl. 23, *a*, 2.
End scrapers	6	4	+								Pl. 23, *a*, 1.
Side-notched points			5		2						Strong, 1935, pl. 7, fig. 1, *d*.
Stemmed points	5	4	?						2		Pl 23, *a*, 3.
Stemmed point, serrated edges.	1	1							2		Wedel, 1935, pl. 9. fig. 1, *e*.
Diamond-shaped beveled knife.			1								Strong, 1935, pl. 7, fig. 2, *c*.
Rectangular knife	?							1			
Oval knife	1										
Work in ground stone:											
Paired shaft polishers			4								Strong, 1935, pl. 17, fig. 1, *f*.
Pipe, stone, right-angle			1								Strong, 1935, pl. 16, fig. 2, n.
Hammerstones	3	+				+					Pl 23, *b*. 1.
Work in antler and bone:											
Bow guard			1								Strong, 1935, pl. 10, fig. 2.
Antler cylinders	5			?		?	?	?			Pl. 22, *a*, 5.
Antler-tip flakers	3					?				2	Pl. 22, *a*, 4.
Rib shaft wrench			1								Strong, 1935, pl. 6, fig. 1, *c*.
Deer leg bone shaft wrench	3					?					Pl. 22, *a*, 2.
Tubular bone bead	28	8	2		4			4	+		Pl. 24, 3,4.
Tubular bone beads, incised		2						2	+		Schultz and Spaulding, 1948, pl. 30, *o*.
Awls	1		+	?		?					Pl. 22, *a*, 3.
Perforated canine teeth		25				7	2	4			Pl. 26, *a*, 2.
Rodent mandibles	1	9				?	?				
Evidence of copper			+								
Pottery	10	13	+		+				+		
Tempering:											
Crushed rock or sand			+		+				+		Strong, 1935, pl. 9, fig. 1.
Crushed calcite	10	13					3		+		Pl. 21, *b*, pl. 23, *b*, pl. 27.
Structure:											
Granular	10	13	+		+		+		+		
Flaky											

See footnotes at end of table.

TABLE 2.—*Comparison of traits from site 14PH4 with those from other burial sites in the immediate area* [1]—Continued

Culture traits	Woodruff 14PH4	Guide Rock 25WT3	Graham 25HN5	Marshall 25HN1	Alma 25HN2	Orleans 25HN3	Flag Creek 25HN4	Robb 25WT4	Holdrege 5 25FR9	Dunn 25FR2	Illustrations
Surface treatment:											
Smoothed	----	----	----	----	----	----	----	----	+	----	
Cord-roughened over all	10	13	+	----	+	----	+	----	+	----	Pl. 27.
Lip:											
Rounded	----	----	----	----	----	----	----	----	----	----	
Flattened	----	1	----	----	----	----	----	----	----	----	Pl. 26, *b*, pl. 27.
Rim profile:											
Collared or braced	----	----	+	----	+	----	----	----	----	----	Strong, 1935, pl. 9, fig. 1.
Straight	----	1	----	----	----	----	----	----	----	----	Pl. 26, *b*, pl. 27.
Flaring	----	----	----	----	----	----	----	----	----	----	
Decorative technique:											
Incised	----	----	+	----	+	----	----	----	----	----	Strong, 1935, pl. 9. fig. 1.
Plain	----	1	----	----	----	----	----	----	----	----	
Harlan Cord-Roughened type.	+	+	----	?	----	?	+	?	+	?	Pl. 21, *b*, pl. 26, *b*, pl. 27.
Upper Republican types	----	----	+	----	+	----	----	----	----	----	Strong, 1935, pl. 9, fig. 1.

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[1] In this table, I have sought where feasible to indicate the relative importance of an element by indicating the number of observed occurrences. Where actual numbers are impractical, I have used a plus sign (+) to show that the element is present, and a blank for no known occurrences. A question mark (?) indicates there is a possibility the trait is present but that data are lacking, because excavation has not been completed or because the site has been disturbed by cultivation or looted by vandals.

[2] Numbered in thousands.

CULTURAL RELATIONSHIPS

The problem of prehistoric burial sites containing shell-disk beads to the near exclusion of other artifacts has been noted by various investigators in Nebraska (Strong, 1935, pp. 116–122, and Wedel, 1935, pp. 174–179). Other ossuaries of a somewhat similar nature contain mixed human bones reinterred with offerings. These, which have been assigned to the Upper Republican complex, contain only limited numbers of finished shell-disk beads and pottery representing Upper Republican types. There can be little doubt that these assignments on the basis of pottery and accompanying artifacts are valid, although it is evident that single flesh burials were also made by some of the Upper Republican groups (Kivett, 1949, p. 282).

In table 2 the artifact types and other data revealed by our investigations at site 14PH4 have been listed and compared with data available from several burial sites in the immediate area. Data for the majority of these sites have been provided by A. T. Hill, who carried on investigations in them intermittently over a period of many years. Several of the sites have not been fully excavated or were disturbed prior to Mr. Hill's work so that certain information may be lacking. At least six other burial sites, which have yielded shell beads and blanks, are known in Adams, Franklin, Harlan, and Webster Counties. For these, however, the data are still less complete.

It has been pointed out (Wedel, 1935, p. 204) that shell beads are rare or absent in ossuaries in which pottery occurs and that pottery is rare or absent in ossuaries in which shell beads are common or abundant. It is evident, however, that such ossuaries are not attributable to a single complex, but rather to at least two distinct complexes. The Graham (25HN5) and Alma (25HN2) sites, which have been assigned to the Upper Republican aspect, are examples of those ossuaries in which pottery is rather common and shell beads relatively rare. The remainder of the sites listed in table 2 appear to be representative of the second type of burial, which is characterized by an abundance of shell work and by relatively few other artifacts. The latter type now appears to be attributable to a Woodland variant. Although pottery has not been commonly found in the shell-bead ossuaries, sherds do occur. Some pottery came from sites 14PH4, 25WT3, 25FR9, and 25HN4, all shell-bead ossuaries. Of the sites characterized by an abundance of shell-disk beads in various stages of completion, only 25WT3 yielded rim sherds (pl. 26, *b*). The sherds from these four sites, although limited in number, are distinct and readily distinguishable from wares of the Upper Republican aspect. They are characteristically thick; have over-all cord-roughening with the cord impressions vertical and parallel on the vessel; and are tempered with crushed calcite, with an occasional inclusion of hematite or fine sand. For convenience, I have designated this type of pottery Harlan Cord-Roughened. Superficially, it resembles the Valley Cord-Roughened type, which characterizes the Valley focus of the Woodland pattern (Hill and Kivett, 1941, pp. 173–181). It appears, however, to be somewhat less well made and to lack the various rim and lip decorations of the Valley Cord-Roughened type. It is now evident that the thick, cord-roughened ware found throughout the Central Plains area represents at least two distinct foci of the Woodland pattern. It seems likely that still other variants will be defined when adequate study is made. The need for specific designations for the Woodland variants has already been noted (Wedel, 1949, p. 338). Certain sherds from Ash Hollow Cave (Champe, 1946, pl. 8) have been tentatively assigned to the Valley focus (Hill and Kivett, 1941, pp. 224–227; Champe, 1946, pp. 112–113). Excavations at site 25HO23, in Hooker County, Nebr., during the summer of 1949 by the Nebraska State Historical Society revealed sherds which are very similar to those from Ash Hollow Cave. They lack rim decorations and certain other characteristics of the Valley I ware. It would appear that the Ash Hollow ware cannot be related directly to the pottery which is characteristic of the Valley focus but rather to an undefined variant which may precede the Valley I material in this area. Other sites in Hooker and Cherry Counties, Nebr., have yielded pottery of the Valley Cord-Roughened type.

The occurrence of a distinctive pottery tempered with crushed calcite in two occupational sites in Harlan County (25HN10, 25HN32), and in two village sites (25FT70, 25FT18) on Medicine Creek in Frontier County, Nebr. (Kivett, 1949, pp. 282–283), appears to justify the designation of the ware as a separate type. Similar pottery is also known from Davis Creek in Sherman County, Nebr., where it occurred in association with other pottery tempered with sand and pebbles (Hill and Kivett, 1941, pp. 219–222). These sand- and pebble-tempered sherds have many characteristics of the Valley Cord-Roughened type, including diagonal cord impressions. A single boatstone was associated with this pottery at Davis Creek. The calcite-tempered ware has been noted from one site in the proposed Amherst Reservoir, Buffalo County, Nebr. Strong (1935, p. 215) describes sherds from the Sandhill region of west-central Nebraska which strongly suggest the Harlan Cord-Roughened type. It is described as "a very heavy ware, ranging from one-quarter to three-eighths of an inch in thickness and of a uniform grayish-brown color. Both surfaces and cross sections of these sherds show numerous holes, apparently where some sort of vegetable tempering has been burned out, and in this sense it is 'hole-tempered.' " In addition, the pottery contains much very fine white sand which probably served for tempering.

Sherds tempered with calcite, when found on the surface or when immersed in a dilute solution of acid, appear to fit the ware described. This pottery, which was described by Strong (1935, p. 125) as Dismal River type A, is no longer believed to be assignable to the Dismal River aspect but rather to a variant of the Woodland pattern.

Calcite-tempered pottery, as noted, has been found on a site in the proposed Amherst Reservoir area, Buffalo County, Nebr. In the same area, as well as in Harlan County and in the Davis Creek Valley, there are other sites which thus far have yielded only Valley Cord-Roughened grit- or sand-tempered ware with decorations on the rims commonly consisting of cord-wrapped-stick or rod impressions and punctates which have produced interior or exterior nodes.

An examination of the collections at the Nebraska State Historical Society reveals two restored vessels and the restored conoidal base of a third vessel which are of the Harlan Cord-Roughened type. These are particularly important in indicating the shape and size for vessels of this type.

The first of these, which has been previously reported as Woodland-like but not assigned to a particular focus, came from site 25FR8, previously known as Red Cloud 3, in Franklin County, Nebr. (Wedel, 1935, pp. 188–189; Hill and Kivett, 1941, pp. 222–224). The vessel, the sherds of which were found scattered over the floor of an Upper Republican house, has a conoidal base and a height of 40.5 cm. (pl. 27).

The interior diameter at the mouth, as reconstructed, is 20.9 cm. and the maximum diameter, which is 10.2 cm. below the lip, is 30.6 cm. The lip is smoothed but undecorated and is slightly rounded and everted. The thickness of the walls varies from 0.9 to 1.8 cm., with the thicker portion near the base. The paste is light gray to buff and is coarsely tempered with crushed calcite, which projects through the inner surface. The exterior is cord roughened; the impressions, 3 to 5 per cm., are vertical and parallel. The only decoration is a small trailed impression resembling a turkey track on the exterior of the vessel approximately halfway down the body.

The conoidal base and the second restored vessel of the Harlan Cord-Roughened type are reported to have been found in a drainage ditch in Richardson County, Nebr., at a depth of 9 feet (Wedel, 1935, pp. 188–189; Hill and Kivett, 1941, pp. 222–224). The restored vessel is very similar to the one from 25FR8 and suggests a remarkable uniformity for this pottery type. The ware in general suggests a much less complex pottery tradition than that represented by the Valley Cord-Roughened type.

At one site, 25SM2, in the Davis Creek Valley, sherds of both Harlan Cord-Roughened and Valley Cord-Roughened types were excavated from a single burial pit (Hill and Kivett, 1941, pp. 219–222). No sherds of the Harlan Cord-Roughened type, however, were recovered from 25VY1, the site at which the Valley Cord-Roughened type was first defined. Certain sherds, from 25VY1 do, however, suggest a basic similarity to the Harlan Cord-Roughened ware (Hill and Kivett, 1941, pl. 10, 1).

Sherds of the Valley Cord-Roughened type have been found with sherds of the Missouri Bluffs Woodland type (Keyes, 1949, p. 97) by the Nebraska State Historical Society in a series of sites on Loseke Creek in Platte County, Nebr. Pottery of the latter type has been illustrated from the Eagle Creek site [6] of northeastern Nebraska (Hill and Kivett, 1941, pp. 234–235), but has not been described. As noted elsewhere in this report, certain traits of the Keith focus are also reported from the Younkin mound in Geary County, Kans. (Schultz and Spaulding, 1948, pp. 306–313). Spaulding has suggested that a considerable part of a large cord-marked jar lacking any sort of decoration from the Younkin mound appears to resemble closely a vessel from the 25VY1 site (Spaulding, 1949, p. 107). This sherd and many of the other artifacts from the same site may bear a closer resemblance to certain artifacts of the Keith focus than to artifacts of the Valley focus.

It is evident that the Harlan Cord-Roughened ware and the artifacts accompanying it are sufficiently divergent to warrant the assignment of the material to a separate focus, the Keith. Temporal differences seem to be indicated, although direct stratigraphic evidence for the sequence of the three previously designated Woodland foci—Keith, Valley, and Sterns Creek—has not been found.

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[6] This site was excavated by the Laboratory of Anthropology, University of Nebraska.

Present evidence indicates that the makers of Harlan Cord-Roughened pottery are responsible for certain ossuaries in which shell beads in various stages of completion occur in relatively large numbers. Among such sites may be mentioned 14PH4 (Woodruff), 25HN1 (Marshall), 25WT3 (Guide Rock), 25HN2 (Orleans), 25HN4 (Flag Creek), 25WT4 (Robb), 25FR9 (Holdrege 5), and 25FR2 (Dunn). Other groups, including the Upper Republican peoples, make far more limited use of finished shell beads as grave goods.

Unfortunately, little is known regarding burial customs associated with other Woodland variants, such as the Valley and Sterns Creek foci. A single occupational site and a group of nearby burial pits in Platte County, Nebr., have been linked tentatively, on the basis of a few sherds with the burials, which were identical with those in the habitation level (Hill and Kivett, 1941, p. 214). This ware is grit-tempered and of the Valley Cord-Roughened type. There were no shell beads with the burials, which consisted of disarticulated bones. Although it is likely that other Woodland groups practiced ossuary burial, it is significant that only sherds of the Harlan Cord-Roughened type have thus far been found in the shell-bead ossuaries.

Schultz and Spaulding have reported a Hopewellian burial site from the lower Republican Valley in Geary County, Kans. (Schultz and Spaulding, 1948, pp. 306–313). Although certain of the artifacts recovered from this burial have definite Hopewellian affinities, others are comparable to those from the Keith focus. These include small stemmed points often with serrated edges, curved shell pendants which are suggestive of the crescentic specimens from site 14PH4, shell-disk beads, conch columella beads, and incised bird bone beads. The single vessel of Woodland type from the Younkin site is also suggestive of the Harlan Cord-Roughened ware, since it has vertical exterior cord marks and some cord impressions on the interior. The occurrence of both primary and secondary human burials, with some of the bones scorched or calcined, is common to the Geary County burial and the shell-bead ossuaries of Nebraska and northern Kansas. On the other hand, the available evidence for the Younkin site does not indicate that the bones were fired in situ, while the burning in the shell-bead ossuaries was, for the most part, in situ. The inclusion of various small animal bones in the deposit appears to be a shared trait. The mound and stones used in the case of the Geary County burial is unlike the pit basin type constructed by the people responsible for the shell-bead ossuaries.

Thus far, no Hopewellian pottery traits or other traits such as platform pipes have been reported from components of the Keith focus. Certain other traits, such as the long bone pins, may be, as suggested by Schultz and Spaulding (1948, p. 312), assignable to an Archaic horizon. Work in additional components of the Keith focus may, however, supply some of these traits, such as the bone pins, and suggest that, if Archaic in origin, they may have been transmitted to the Western Hopewellian complex by way of Central Plains Woodland variants or variant, such as the Keith focus. Recent excavation by the Nebraska State Historical Society of a series of burials on Queen Hill (site 25CC55), Cass County, Nebr., has revealed a bone artifact very similar to the pins from the Younkin Mound (Schultz and Spaulding, 1948, pl. 30; 1). This pin was associated with a multiple flesh burial containing three individuals. At the present time the burials cannot be culturally identified.

Certain inferences may now be drawn from the chart comparing ten burial sites in the Republican drainage of south-central Nebraska and north-central Kansas. It has been satisfactorily demonstrated by Strong (1935) that two of these sites, the Graham and Alma Ossuaries, are attributable to the Upper Republican aspect. Later investigations and study have served to substantiate this classification. Only two of the other sites have been previously described. The first of these, the Marshall Ossuary (25HN1), has been described by Strong but has not been classified. The second, Holdrege 5 (25FR9), was described by Wedel and tentatively assigned to the Lost Creek focus of the Upper Republican aspect. On the basis of present evidence, it now appears that all of the sites listed, with the exception of the Graham and Alma Ossuaries, are assignable to a Woodland complex. As a result of the excavation of two sites of this complex and less extensive investigations at five other similar sites, it further appears that a separate focus is represented. This has been designated the Keith focus of the Orleans aspect, of an unnamed western phase, of the Woodland pattern. The Valley focus is also tentatively assigned to the Orleans aspect.

There are, from a study of both the villages and burial pattern, certain traits which now appear diagnostic for the Keith focus (Kivett, 1949, pp. 282–284). These include the abundant use as grave furnishings of ornaments fashioned from both fresh-water and marine shells, with a large number of blanks and unfinished shell-disk beads; triangular pendants; crescent pendants; right-angle-perforated beads; small chipped celts; small to large stemmed and barbed projectile points, often serrated; incised tubular bone beads; perforated canine teeth (pl. 26, *a*, 2); unperforated rodent teeth; and pottery of the Harlan Cord-Roughened type. Drilled and undrilled shell-bead blanks appear to be particularly helpful in distinguishing the Woodland ossuaries from those assignable to the Upper Republican aspect.

There are some basic similarities which may indicate a general relationship between certain of the Upper Republican and the Woodland burials. The deposition of some primary as well as secondary burials in a basin and the occurrence of finished shell-disk beads, ornaments fashioned from conch shell, olivella beads, gastropod beads, retouched flake knives or scrapers, end scrapers, shaft wrenches fashioned from deer-leg bones, undecorated tubular bone beads, and hammerstones are traits which appear to be shared by both complexes.

Identification of the shell from the Woodruff Ossuary indicates that the source of nonlocal material was largely to the southeast via the Mississippi drainage. A single worked specimen of marine shell from a component of the Keith focus (25FT18) in Frontier County, Nebr., has, however, been identified as *Agaronia testacea* (Lamarck) from the Gulf of California or western Mexico.[7] Whether this indicates direct trade relations with that area or indirect trade by way of the Mississippi drainage is not known. The latter route, however, would seem more likely.

Certain shell was altered so extensively during its manufacture into artifacts that, although it suggested a marine origin, specific identifications were not possible. It is evident, however, that marine shell of southeastern origin was in use by people both of the Keith focus of the Woodland pattern and of the Lost Creek focus of the Upper Republican aspect.

Identified Shells,[1] 14PH4

	Number of specimens
Unworked specimens:	
Quadrula quadrula (Rafinesque)	7
Lampsilis ventricosa occidens (Lea)	7
Obovaria olivaria (Rafinesque)	1
Lasmigona complanata (Barnes)	2
Worked specimens:	
Lampsilis ventricosa occidens (Lea) (?)	7
Olivella sp. (probably *nivea* Gmelin) (range south Florida to Texas, México, and West Indies)	1
Heavy-shelled species of Unionid (fresh-water mussel) from the Mississippi River drainage;[2] fragment of shell	1
Busycon contrarium (Conrad) *columella* (from Gulf of Mexico)	1

[1] Identifications by Dr. Harald A. Rehder and Dr. J. P. E. Morrison, Division of Mollusks, U. S. National Museum, Smithsonian Institution.

[2] Probably not from shell taken from river or stream near the site.

Excavations at village sites of the Keith focus have revealed them to be small, with remains of not more than four to six structures (Kivett, 1949, pp. 282–283). Present information suggests such sites are somewhat smaller than the 25VY1 site of the Valley focus. It is estimated that remains of at least 61 individuals were deposited in the Woodruff Ossuary; the Guide Rock, Orleans, and other burial sites may have been even larger. It seems likely that such burial grounds were utilized by the occupants of more than one village in the area, in view of the considerable time and effort which must have been required for the manufacture of the abundant grave goods.

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[7] Identified letter of March 24, 1949, Harald A. Rehder, Curator, Division of Mollusks, U. S. National Museum, Smithsonian Institution.

Thus far, intensive excavations at two occupational sites have failed to reveal evidence of horticulture, and subsistence appears to have been based largely on hunting and gathering. Although a majority of the sites located thus far are burials, it seems likely that an examination of suitable areas in the vicinities of them will reveal numerous small village sites. Thus far, most of these have been situated on low inconspicuous knolls and terraces along the smaller tributary streams.

As a working hypothesis, based largely on typology, a tentative chronological sequence for certain Woodland variants in the Central Plains may be suggested. The Keith focus probably represents one of the earliest Woodland variants in this area. Materials from site 25HO23, previously noted, may fall into the same general time period. The presence of certain traits of the Keith focus in the collection from the Younkin Mound (Schultz and Spaulding, 1948) suggest some contact between the people of the Keith focus and those of the Central Plains Hopewellian manifestation. The Valley I type of material may represent a Hopewellian influence on a simple Woodland complex such as the Keith focus. This would suggest that the Valley focus is, in general, later than the Keith focus and perhaps roughly contemporaneous with the Kansas City Hopewellian complex (Wedel, 1943).

Certain characteristics of the Valley Cord-Roughened ware which occur on sherds from Loseke Creek and Eagle Creek suggest that this undefined variant may have been influenced by, and be in general, later in time than the Valley focus. Although the Sterns Creek focus has not been fully defined, it may prove to be more closely related to the Loseke Creek and Eagle Creek sites than to the Woodruff Ossuary or 25VY1 sites.

Relationships to such Middle Ceramic groups as the Upper Republican aspect have not been clearly demonstrated. The ossuary burial characteristic of certain of the Woodland variants and the Lost Creek focus of the Upper Republican aspect may be a significant factor in this connection when these Woodland variants are adequately defined.

SKELETAL REMAINS OF THE WOODRUFF OSSUARY (14PH4)[8]

Some skeletal remains of not less than 61 individuals were recovered from the Woodruff Ossuary. This count is based on a consideration of the mandibles in the collection. The more numerous of the other bones counted gave figures far below that of the mandibles, e. g., right patellae 31, right calcanei 36, right tali 34, atlases 29, and axes 21. Despite the large number of mandibles, there was a remarkable scarcity of other cranial bones. The distribution of age groups as estimated from 56 mandibles is as follows:

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[8] Compiled from a study by Robert B. Cumming, Jr., River Basin Surveys, Smithsonian Institution.

Age group:	*Number of occurrences*	*Percent*
Infant X–2½ years	11	21
Child 2½–6 years	13	23
Child 7–12 years	1	1
Adult 25–55 years	22	39
Old adult 56–76 years	9	16

The estimation of age for the first groups is based on tooth eruption; that of the last two groups on general appearance and tooth wear.

An attempt to sex 26 adult mandibles, without further supporting evidence, gives the following results: 21 (81 percent) male, 1 (4 percent) female, and 4 (15 percent) probably female. Twenty-one adult innominate bones, representing at least 19 and probably 21 individuals, were examined. None of the bones could be paired on the basis of provenience and only two pairs seemed even probable, as judged from appearance and size. Of the unpaired innominates 10 are male and 7 female. Both of the two possible pairs are female; hence the percentage of females is 47 percent if the innominates are considered singly, 52 percent if two pairs are actually represented.

Of 16 adult femora, there are no definite pairs on the basis of provenience; however, upon inspection 3 pairs seem probable, 1 male and 2 female. The ratio of the sexes, if judged from individual femora, is 8 to 8; if three pairs are considered, the proportion is six females to seven males. Although a large percentage (81 percent) of the mandibles appeared to be male, the sex ratio as judged from innominate bones and femora suggest that male and female burials may have been approximately equal in number, with no evidence of a particular selection of individuals for burial in the ossuary.

An approximation of stature, calculated with the aid of the Manouvrier tables and based on the bicondylar length measurements of five male and five female femora, considered as unpaired, indicates a stature for the males of about 165.2 cm. (5 feet 5 inches) with a range of 162.7 to 169.9 cm., and for the females 157.7 cm. (5 feet 2 inches) with a range of 155.4 to 161.2 cm.

Observations of the dentition of the ossuary population were made on 28 adult mandibles, 15 complete and 13 with one side missing. Through postmortem loss, an average of 33 percent of the teeth are missing from the complete mandibles and 83 percent from the half-mandibles. Twelve of the mandibles (43 percent) have teeth containing caries, a total of 17 cavities being found in all the teeth examined. No caries appear in 26 mandibles, representing ages of 1 to 20 years. Of the 17 cavities, 12 are apical, 3 gingival, and 2 interdental.

A total of 18 abscesses occur in 10 (36 percent) of the 28 adult mandibles. No abscesses occur in adolescent mandibles. Most of the teeth show much wear, attrition being pronounced or very pronounced in 82 percent of the adult mandibles. This extreme tooth wear, which is noticeable in early adulthood, appears to be the immediate cause of the abscesses. Evidence of a slight degree of crowding of the teeth occurs in 36 percent of the 28 mandibles. Five cases of an impacted third molar occur. In three of the five cases the third molar is very small.

Evidences of pathological conditions are not numerous, although examination of 538 vertebrae revealed three cases of fused vertebrae, one lumbar and two thoracic, indications of spondylitis deformans or arthritis. There are several cases of marked lipping in lumbar vertebrae. One lumbar vertebra shows a considerably enlarged left superior articular process, another a thickened and shortened right transverse process, and one cervical vertebra an enlarged left superior and inferior articular process. The one complete adult cranium (pl. 28; 4) contains a supernumerary incisor imbedded just below and at right angles to the left incisors of the maxilla.

In summary, the skeletal materials from the Woodruff Ossuary represent one of the few collections from the Central Plains prior to the historic period which has been culturally identified. The remains appear to represent all age groups from infants to very old adults. With the exception of one individual all of the burials were secondary. Among the adults approximately as many females as males are represented. From observations based on a limited series these "Shell Bead People" appear to have been moderate in size and lack, in general the robust characteristics of the historic Sioux and Pawnee. Pathological conditions, as indicated by skeletal evidence, were not numerous, but evidence of arthritis may be present, and because of a rapid degree of tooth wear, cavities and abscesses in adulthood were relatively common.

No direct anthropometric comparisons are possible at the present time between these people of the Early Ceramic period and those of the Middle Ceramic such as the Upper Republican and Nebraska Culture groups. Limited skeletal collections for certain of the Upper Republican groups as well as for some of the other complexes are available but have not yet been studied. Limited skeletal collections which are available from other Woodland variants in the area would also provide some data.

Cranial measurements have been taken of the one complete adult skull (Feature 16, specimen No. 14PH4–1436), and are tabulated below. The cranium, which appears to be male, is deformed by a slight degree of flattening of the central portion of the occipital region and a marked asymmetry of the right occipital and right parietal. The maximum length measurement is slightly affected and the maximum breadth measurement affected to a greater degree. Views of the cranium are shown in plate 28.

All measurements were taken in accordance with the directions of Martin (1928) unless otherwise indicated.

Cranial measurements, specimen 14PH4—1436

Calvarium:	mm.
Maximum length	165
Maximum breadth	138
Basion-bregma height	138
Thickness left parietal	7
Minimum frontal diameter [1]	90
Ophryonic horizontal circumference	483
Sagittal (nasion-opisthion) arc	336
Frontal (nasion-bregma) arc	120
Parietal (bregma-lambda) arc	122
Occipital (lambda-opisthion) arc	94
Transverse arc [2]	313
Gnathion-nasion height [3]	130
Upper alveolar point-nasion height	79
Bizygomatic maximum	132
Endobasion-nasion diameter	104
Endobasion-prealveolar point diameter	94
Orbital height, right	38
Orbital height, left	38
Orbital breadth from dacryon, right	41
Orbital breadth from dacryon, left	39
Nasal height	56
Calvarium—Continued	mm.
Nasal breadth	23
Maxillo-alveolar length	52
Maxillo-alveolar width	61
Mandible:	
Height of symphysis	38
Total mandibular length [4]	109
Height of body	30
Thickness of body [5]	14
Bigonial width	93
Bicondylar width	114
Height of ramus	60
Maximum width, ascending ramus, left [6]	39
Minimum width, ascending ramus, left	28
Mandibular angle	125°
Indices:	
Cranial index	83.64
Height-length index	83.64
Cranial module	147.0
Gnathic index	90.38
Zygo-frontal index	68.18
Fronto-gonial index	103.33
Zygo-gonial index	70.45
Facial index	98.48
Upper facial index	59.85
Orbital index, right	92.68
Orbital index, left	97.44
Nasal index	41.07
Maxillo-alveolar index	117.31
Mandibular index	95.61

[1] Measured at 3 points 1 cm. above the temporoparietal suture and averaged.

[2] Measurement taken in accordance with Morant (1923), measurement Q 1.

[3] No allowance made for tooth wear.

[4] Single measurement taken with goniometer.

[5] Measurement taken in accordance with Hrdlička (1947).

[6] Measurement taken across top of condyles.

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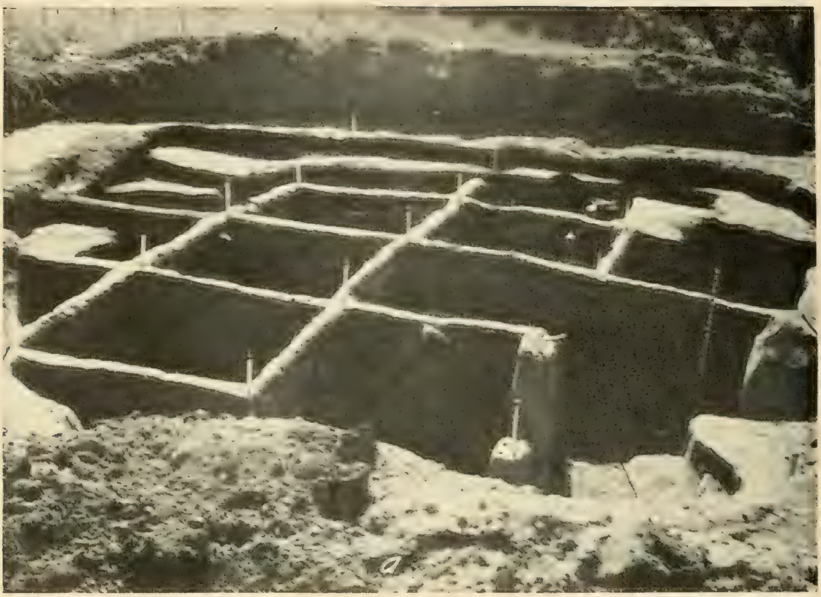
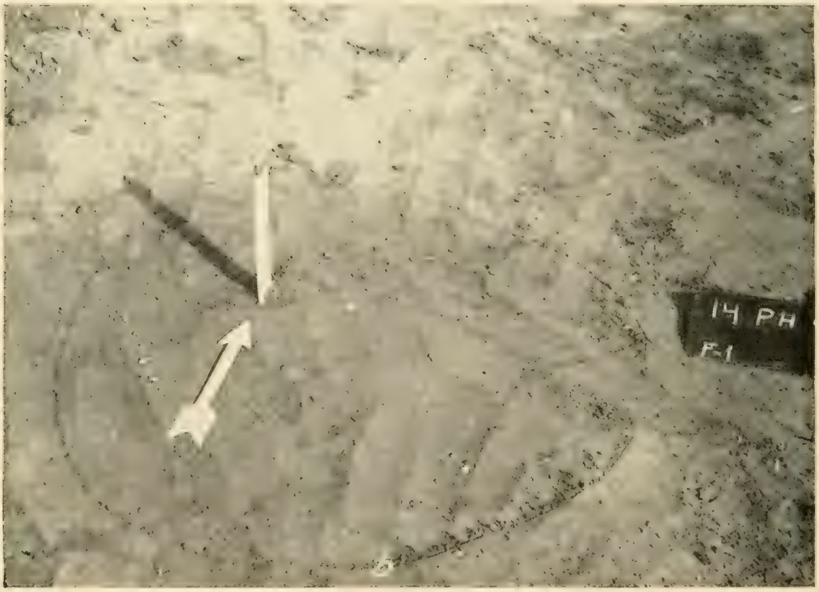
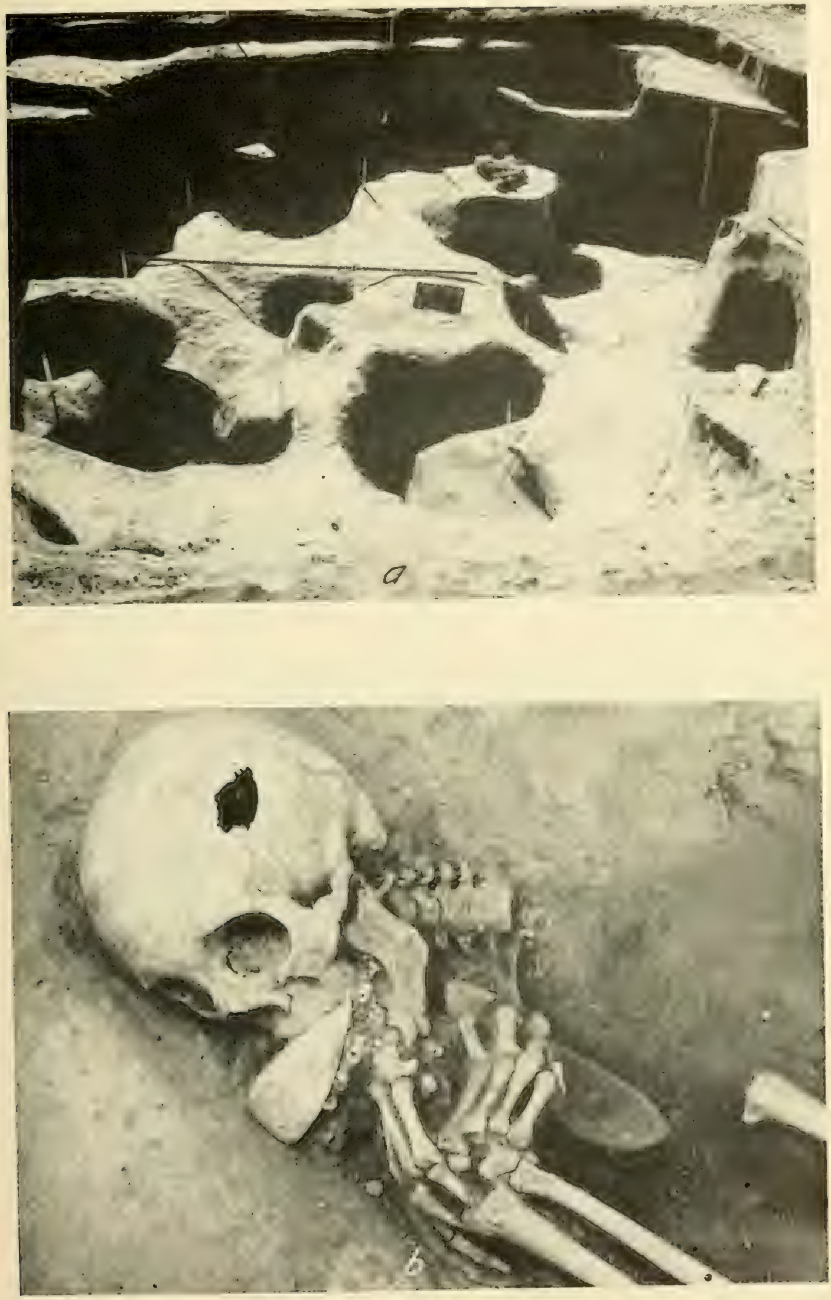
a, View to southwest toward Woodruff Ossuary, site 14PH4. Trees border the course of Prairie Dog Creek. *b*, Looking northeast across burial pit, site 14PH4, after the removal of plowed soil. Stakes mark 5-foot sections.

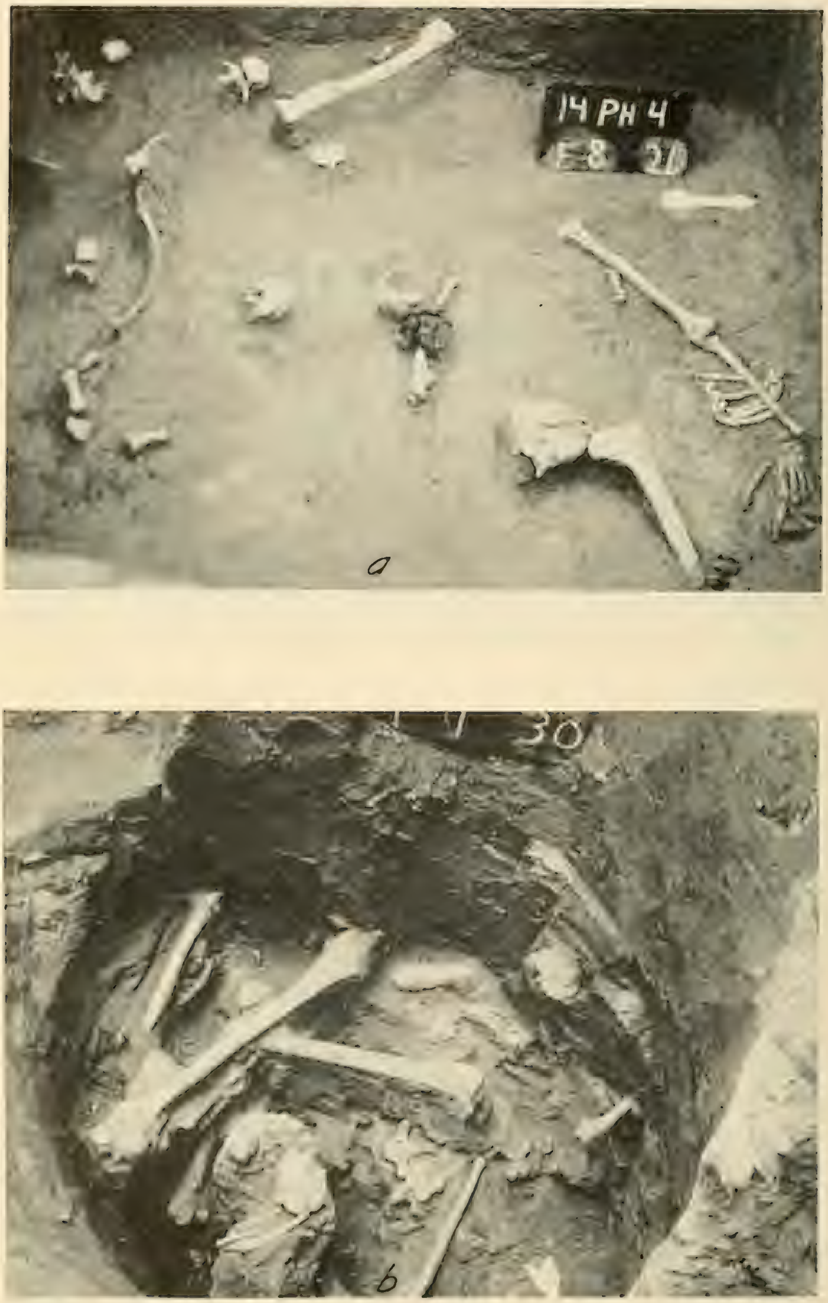




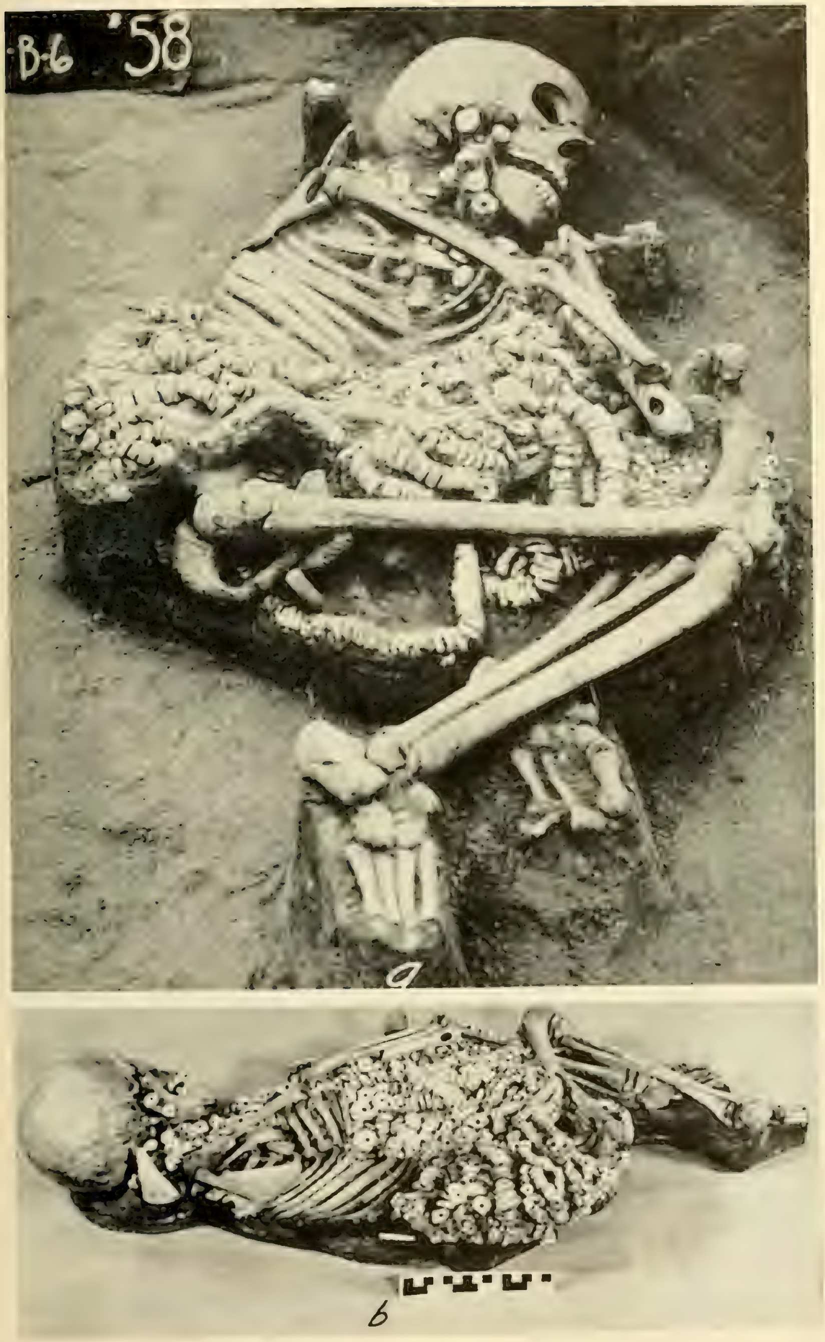
a, Looking southeast across burial pit, site 14PH4, showing section walls. *b*, Discoloration which marked feature 1, a pit, at depth of 12 inches, site 14PH4. Arrow points to magnetic north.



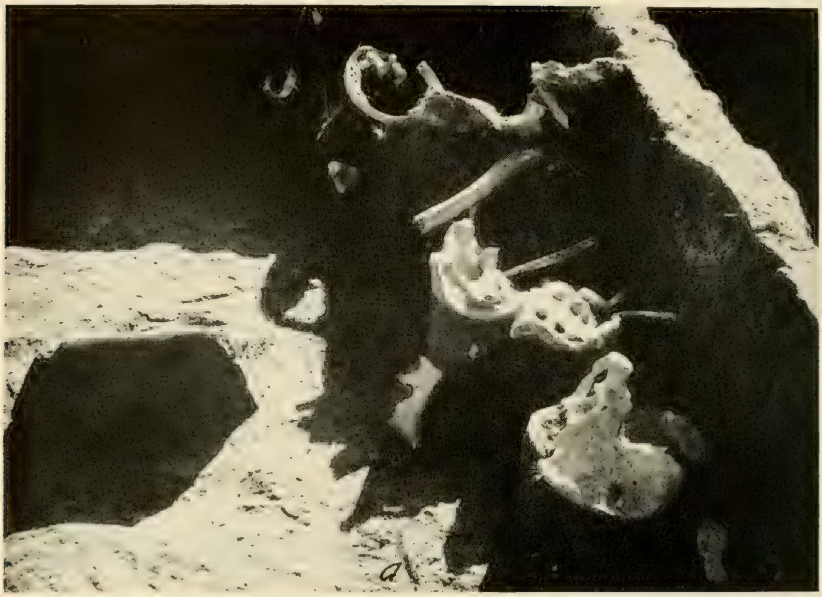
a, Looking south across burial pit at site 14PH4 after removal of all disturbed soil. Feature 21, the single flesh burial, remains in situ. *b*, Feature 16, site 14PH4, a partially articulated adult skeleton. Note shell ornaments near mouth of skull.

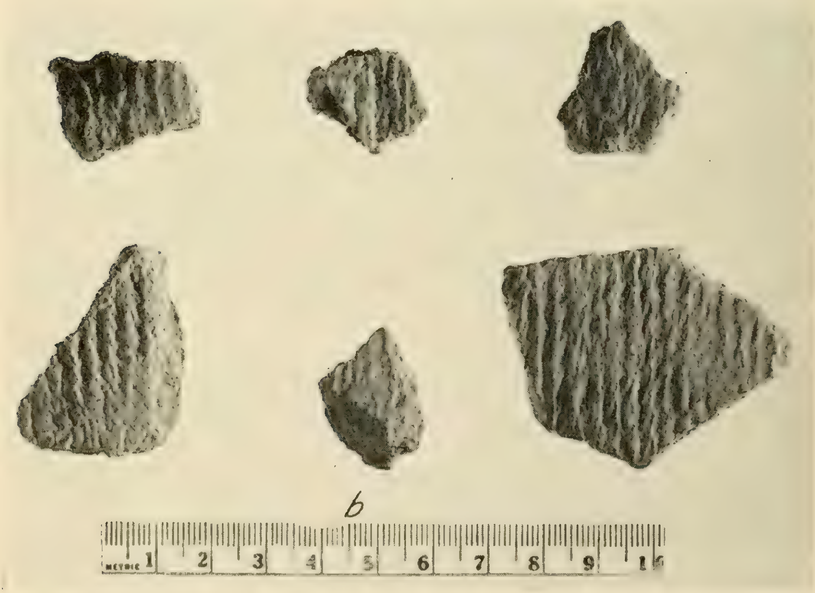


a, Feature 8, site 14PH4, an area of scattered human bones showing some articulation. Arrow points to magnetic north. Note alinement of beads. *b*, Feature 9, site 14PH4, a pit filled with disarticulated human bones. Arrow points to magnetic north.

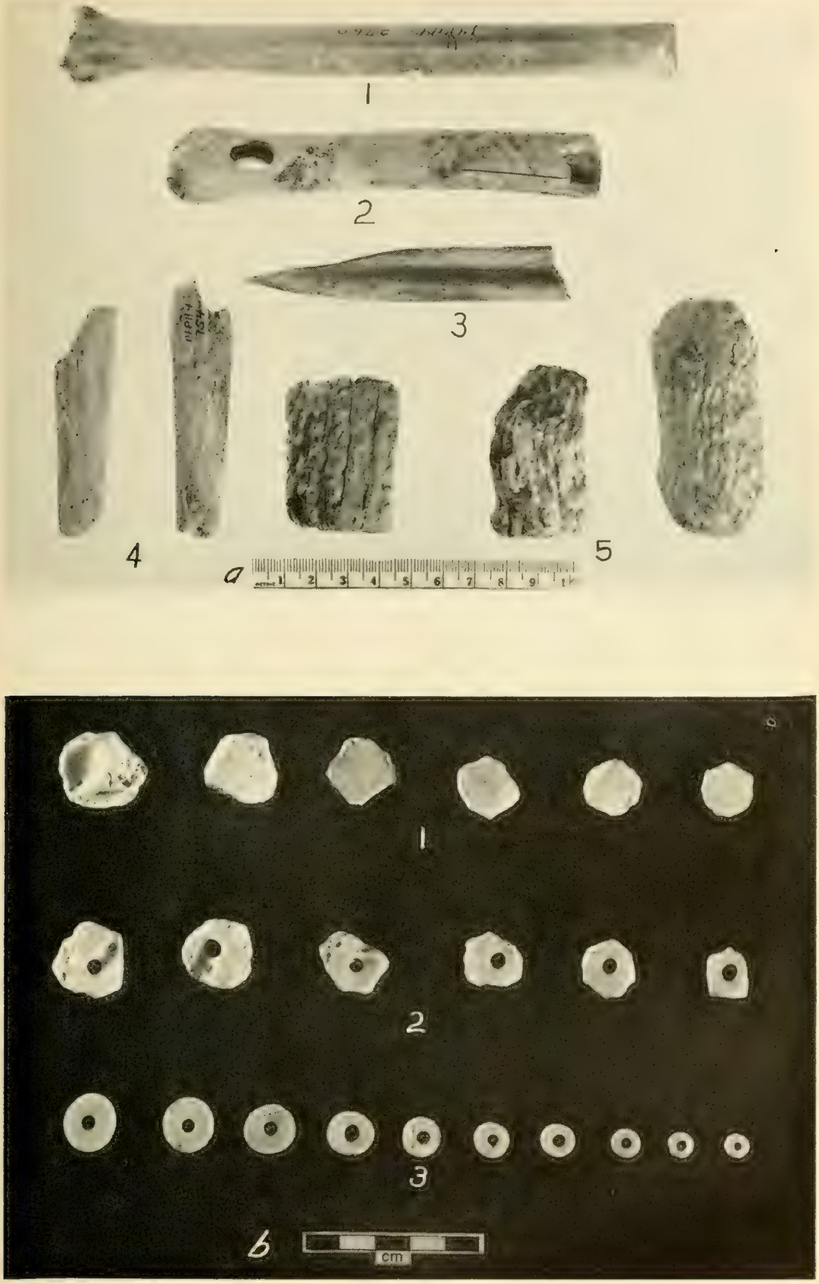


a, Feature 21, site 14PH4, looking south. *b*, Feature 21, site 14PH4, after removal to the laboratory in a plaster cast. Note triangular shell pendant near back of skull. Scale is metric and English.

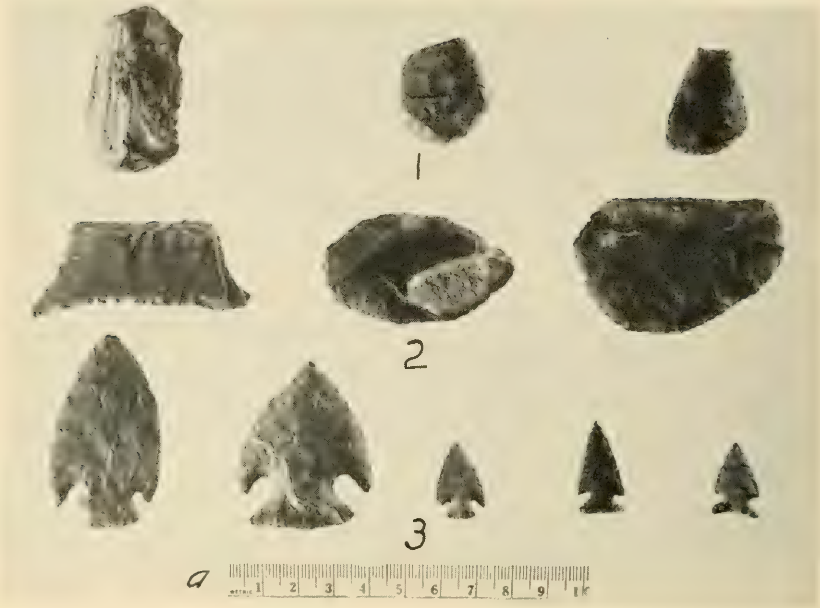



b
METRIC 1 2 3 4 5 6 7 8 9 10

a, View in east area of burial pit, site 14PH4, showing typical disarticulated condition of bones. *b*, Sherds from burial pit, site 14PH4. Scale is metric.



a, Bone and antler artifacts from site 14PH4. Scale is metric. *b*, Stages in manufacture of shell disk beads, site 14PH4. *1* Unperforated blanks; *2*, drilled or partially drilled blanks; *3*, finished beads, showing range in size. Scale is metric.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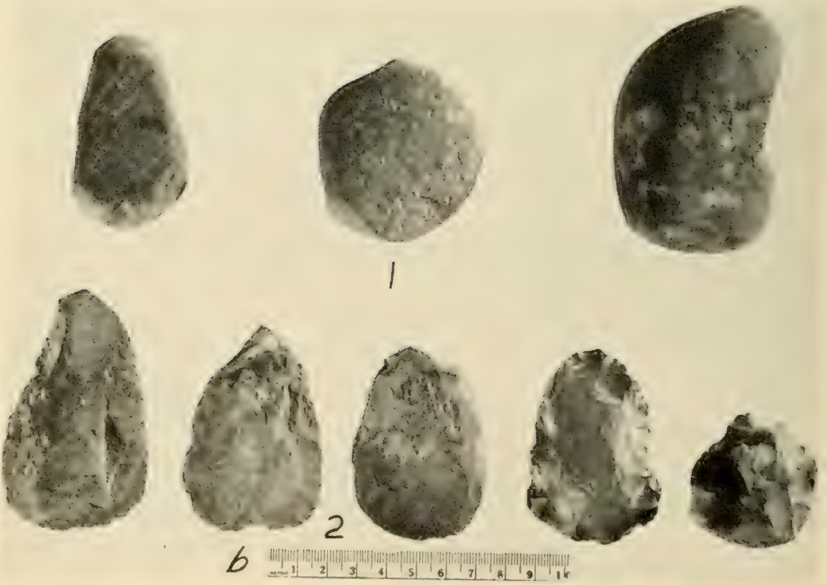
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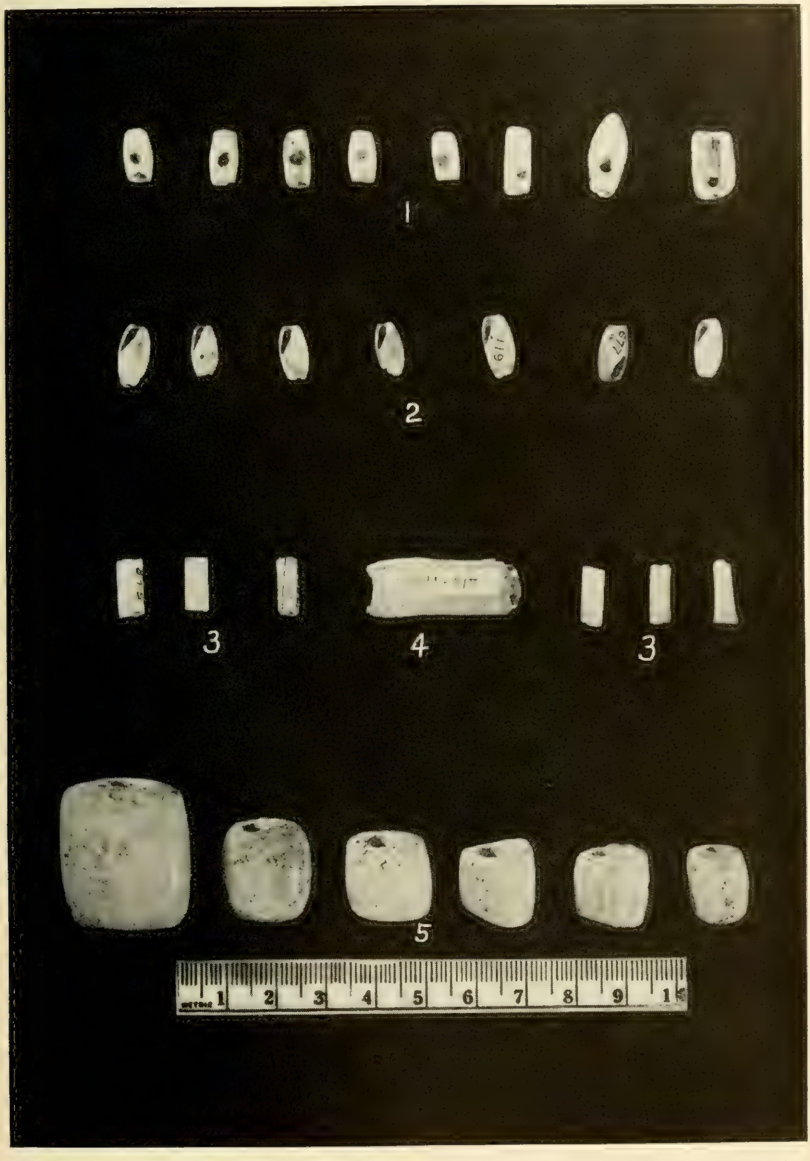
METRIC 1 2 3 4 5 6 7 8 9 10

a, Chipped-stone artifacts from site 14PH4. Scale is metric. *b*, Stone artifacts from site 14PH4. *1*, Hammerstones; *2*, chipped-stone celts. Scale is metric.


1
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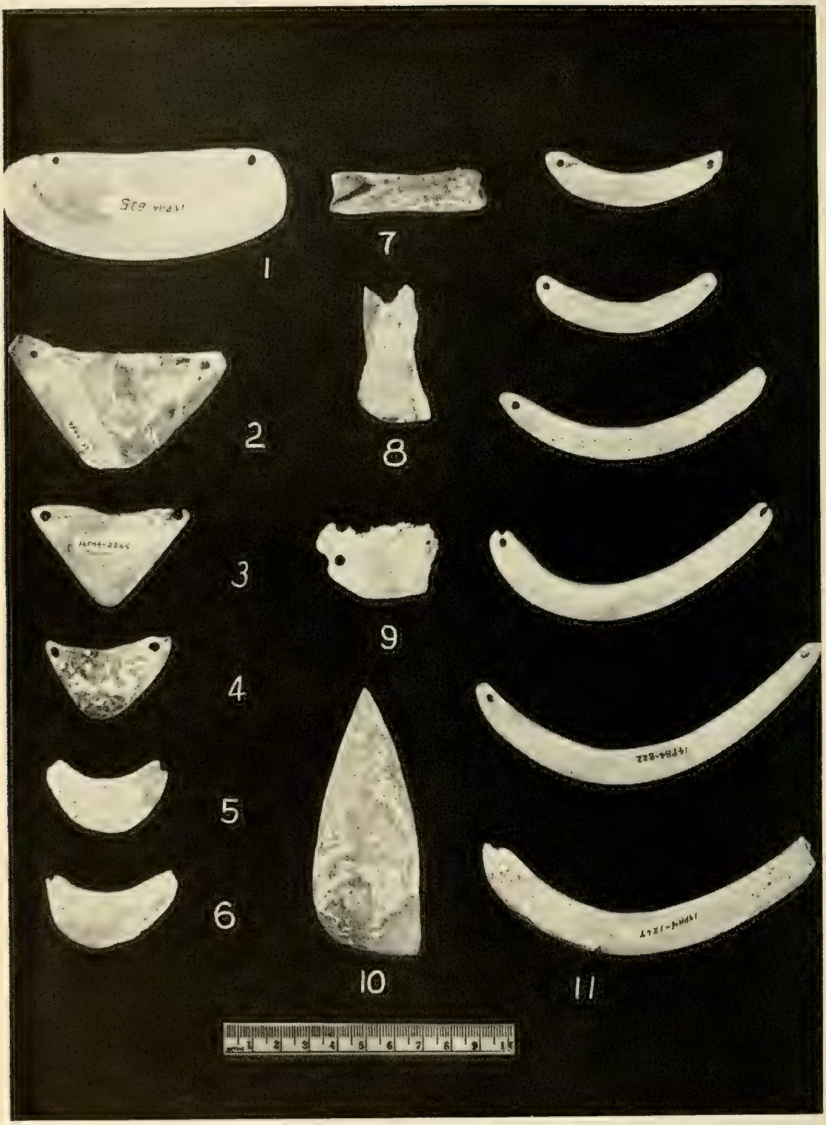
METRIC 1 2 3 4 5 6 7 8 9 10

Artifacts from site 14PH4. *1 2 5*, made of shells; *3*, *4*, of bone. Scale is metric.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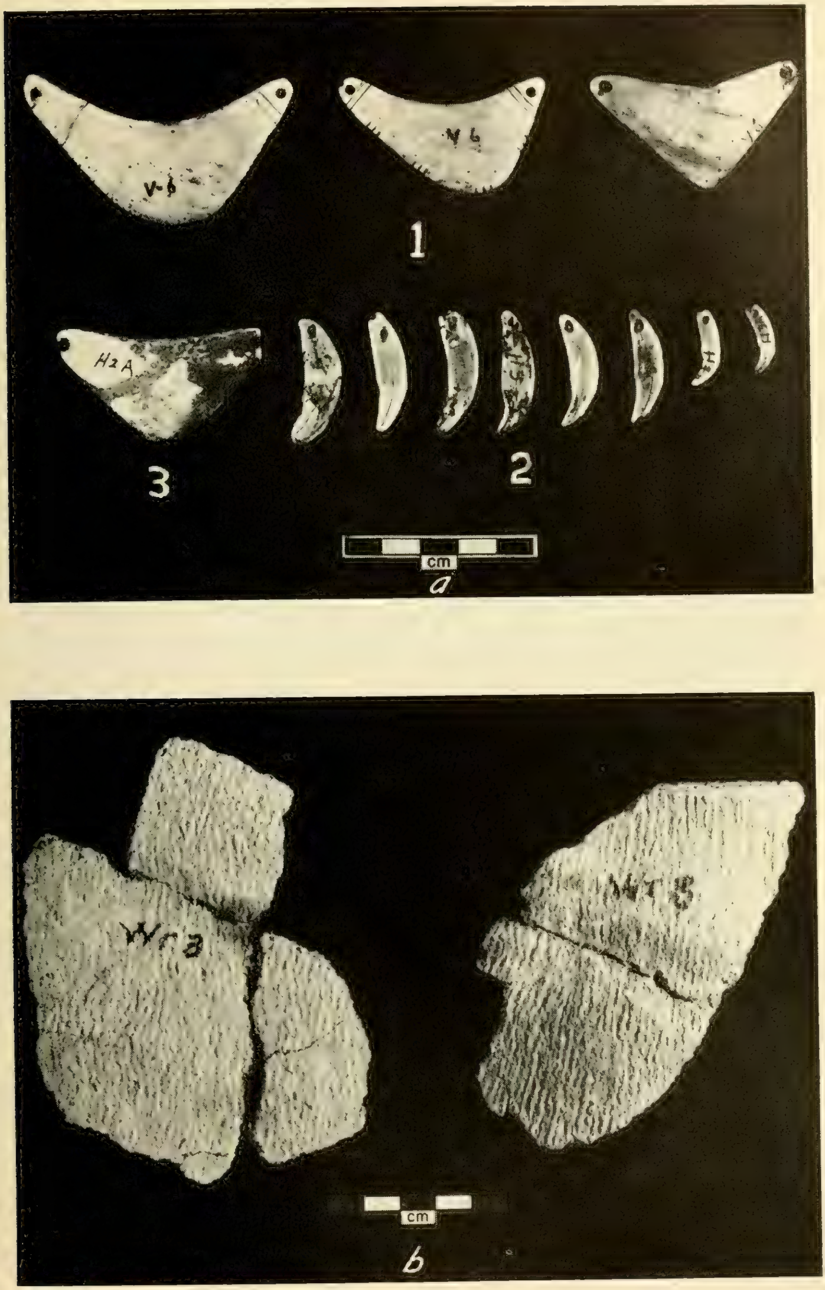
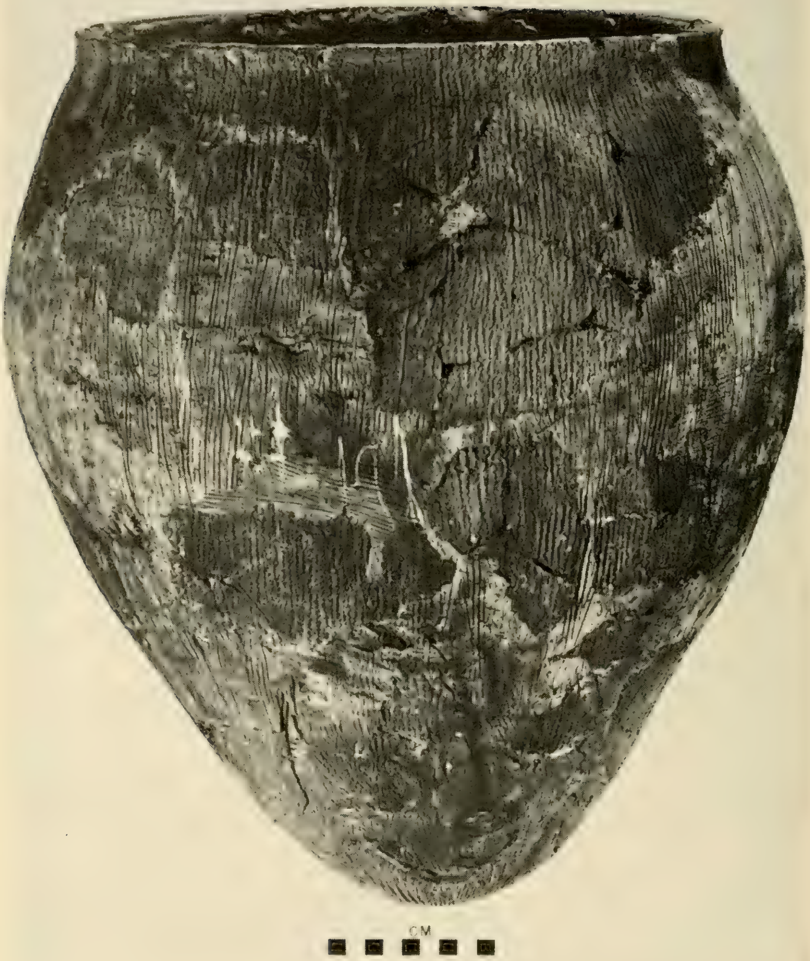
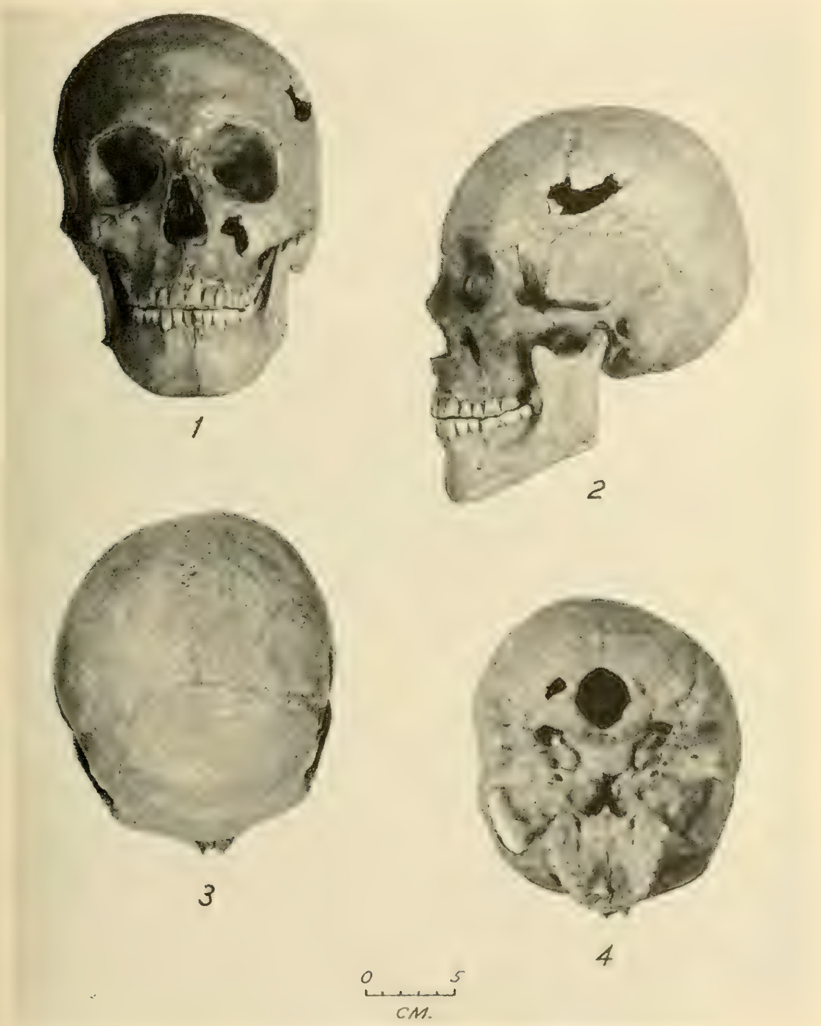
Marine and fresh-water shell ornaments, site 14PH4. Scale is metric.



a, Artifacts from various sites. *1*, Triangular shell pendants from Robb Ossuary, site 25WT4; *2*, perforated canine teeth from Guide Rock Ossuary, site 25WT3; *3*, Guide Rock Ossuary. *b*, Sherds from Guide Rock Ossuary, site 25WT3. *Left*, Body sherd. *Right*, Rim sherd. Scale is metric.



Restored vessel of the Harlan Cord Roughened type from site 25FR8. Scale is metric.



Four views of male skull (14PH4–1436) from Woodruff Ossuary.

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Bulletin 154

River Basin Surveys Papers, No. 4

The Addicks Dam Site

I. An Archeological Survey of the Addicks Dam Basin, Southeast Texas

By JOE BEN WHEAT

953842—53——11

CONTENTS

PAGE

Acknowledgments 149

Introduction 151

Environment 152

- Topography 152
- Geology 154
- Drainage system 154
- Climate 155
- Biota 156

Ethnohistory 157

- Early exploration of the Galveston Bay area 158
- Founding of the missions 160
- The historic Indians around Galveston Bay 160
- The culture of the Galveston Bay Indians 161

Descriptions of Addicks Basin sites 163

- The Addicks "Mound" (42/66A6–1) 164
- Site 42/66A6–6 166
- Site 42/66A6–7 166
- Site 42/66A6–8 167
- The Doering site (42/66A6–2) 167
- Site 42/66A6–5 173
- Site 42/66A6–4 174
- The Kobs site (42/66A6–3) 176
- The Grisbee site (42/66A3–1) 182

Material culture 184

- Pottery complex 184
  - Goose Creek Plain 184
  - Goose Creek Incised 189
  - Tchefuncte Stamped 190
  - Unidentified wares 190
  - Miscellaneous objects of clay 190
  - Ceramic stratigraphy 190
  - Discussion 192
- Lithic complex 196
  - Projectile points 201
    - Upper level types 201
    - Miscellaneous upper level types 203
    - Middle and lower level projectile points 204
    - Unplaced projectile point types 211
    - Projectile point stratigraphy 214
    - Discussion 218
  - Miscellaneous lithic artifacts 220
    - Knives 220
    - Scrapers 224
    - Choppers 225
    - Drills 225
    - Miscellaneous chipped stone 227

Material culture—Continued
    Lithic complex—Continued
        Miscellaneous lithic artifacts—Continued PAGE
            Ground stone 227
            Miscellaneous minerals 228
            Stratigraphy and discussion of miscellaneous lithic artifacts 228
    Bone, antler, and shell complex 230
        Bone 231
        Antler 232
        Shell 233
        Stratigraphy and discussion of bone, antler, and shell artifacts 233
Subsistence 234
    Animal bone refuse 236
Summary and conclusions 238
Appendix: Trait list for Addicks Basin sites (table 9) 247
Literature cited 248

ILLUSTRATIONS

PLATES

29. Doering site and profile 252
30. Kobs site and view of excavation showing Burial 6 252
31. Pottery, restored vessels 252
32. Pottery, decorated sherds 252
33. Pottery, decorated sherds 252
34. Projectile points: Perdiz Pointed Stem, Scalhorn Stemmed, Eddy Stemmed 252
35. Projectile points: Alba Barbed, Kobs Triangular, and Provisional Types Nos. 1, 2, 3, and 4 252
36. Projectile points: Gary Stemmed points 252
37. Projectile points: Provisional Types Nos. 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and Wells Contracting Stem 252
38. Projectile points: Provisional Types Nos. 15, 16, 17, 18, 19, 20, 21, 22, 23, 24; Pedernales Indented Base, and Clovis Fluted (?) 252
39. Projectile points, unplaced chronologically: Provisional Types Nos. 25, 26, 27, 28, 29, 30, 31, 32; Copena point, Plainview point, and Baird Beveled point 252
40. Knives: Types Nos. 1*a*, 1*b*, 1*c*, 1*d*, 2, and 3 252
41. Knives: Types Nos. 4, 5, 6*a*, and 6*b* 252
42. Scrapers 252
43. Choppers 252
44. Drills, gravers, and eccentric flint 252
45. Ground stone: Atlatl weight, sandstone abraders and saws, milling stone, and handstone 252
46. Miscellaneous minerals and paint pigments 252
47. Artifacts of bone, antler, and shell 252

FIGURES

4. Map of general area 153
5. Map of site distribution with inset showing relation of Addicks Dam, Barker Dam, and Houston, Tex 163
6. Sketch map, Addicks "Mound" 164
7. Sketch map, Doering site (42/66A6–2) 168

PAGE
8. Contour map and plan of excavation, Doering site (42/66A6–2) 169
9. Profiles, Doering site (42/66A6–2) 170
10. Burials, Doering site (42/66A6–2) 172
11. Sketch map, site (42/66A6–4) 175
12. Stratigraphic section, site (42/66A6–4) 175
13. Sketch map, Kobs site (42/66A6–3) 176
14. Contour map and plan of excavation, Kobs site (42/66A6–3) 177
15. Profiles, Kobs site (42/66A6–3) 179
16. Burials, Kobs site (42/66A6–3) 180
17. Sketch map, Grisbee site (42/66A3–1) 182
18. Stratigraphic section, Grisbee site (42/66A3–1) 183
19. Pottery: Rim and lip profiles 186
20. Pottery: Vessel shapes 187
21. Pottery: Base shapes 188
22. Graph showing comparative projectile point stratigraphy of Doering and Kobs sites 215
23. Relative chronology of the Addicks Basin sites 243

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AN ARCHEOLOGICAL SURVEY OF THE ADDICKS DAM BASIN, SOUTHEAST TEXAS

By Joe Ben Wheat

INTRODUCTION

The archeological survey of the Addicks Dam Basin was initiated in March 1947 by the writer as a part of the River Basin Surveys. The initial phase of the operation involved the locating, testing, and evaluation of all sites likely to be damaged or lost through the construction of the reservoir and associated channel rectification and subsequent inundation, silting, etc. This phase culminated in the partial excavation of two sites, begun late in May and concluded on July 15, 1947.

This paper constitutes a report on the survey and excavation of the Addicks Dam Basin sites. The area is poorly known historically and almost unknown archeologically.[1] Sporadic collecting has been done by amateurs in plowed fields, stream channel exposures, as well as some minor digging into two or three known middens, but the existence of numerous small middens located along the drainage ways was unsuspected. Since this research marks the first major archeological research done in the area, the results have been presented in some detail. The construction of a local chronology and correlation with other areas has been carried as far as the data warrants. The lack of strictly comparable published material has made such correlation difficult.

The Addicks Dam, on South Mayde Creek, is one of two flood prevention dams designed to protect the city of Houston, Tex., from flooding by the waters of Buffalo Bayou, a tributary of the San Jacinto River. This project, under the direction of the United States Corps of Engineers, consists of the already completed Barker Dam, on the main channel of Buffalo Bayou, and Addicks Dam, under construction at the time of the survey, which will impound the flood waters of South Mayde, Langham, Horsepen, Bear, and Turkey Creeks, permitting the main channels to maintain a normal flow. A third project, White Oak Dam, to be constructed on White Oak Creek, is under consideration at the present time.

---

[1] Pearce, 1932 *a* and 1932 *b*, briefly mentions the area under consideration, basing his remarks on the collections of several local amateurs and upon a few short visits to some of the sites around Galveston Bay. Sayles, 1935, combined survey data and ethnohistorical material to propose an Attacapan Phase chiefly historic in time. These data will be further considered below.

Addicks Dam lies about 16 miles west of the city of Houston, to the north of highway U S 90 and the Missouri, Kansas, & Texas Railway. It is of earthen construction, the earth having been taken from borrow pits on either side of the embankment. The construction of this dam was initiated in 1943 and continued intermittently during the war years. At the time of the survey it was nearing completion.

The numbering of sites follows the system in use by the Texas Council of Archeology. This numbering system is as follows: The State of Texas is divided into a number of quadrangles, each circumscribing 1 degree of latitude and longitude and numbered consecutively, beginning in the northwest corner and running from west to east. These are divided into four equal subquadrangles, lettered A, B, C, and D, also beginning in the northwest quadrant. The lettered subquadrangles are further divided into 9 units, each comprising 10 minutes of longitude and latitude. Sites are numbered serially, as reported, within the smallest unit; e. g., 66A6–1: 66 (major quadrangle) A (subquadrangle) 6 (subunit) –1 (serial number of site). The prefix, 42, is placed before the site number to indicate the State of Texas in the alphabetical order followed by the Smithsonian Institution.

Projectile point names are, for the most part, those in use by the University of Texas, and the present specimens have, in each case, been checked by Krieger, Kelley, or Campbell, of the university staff. Other named types will be discussed below.

The cultural manifestations of the Addicks Dam Basin have been arbitrarily divided into three periods or levels of occupation, these being termed lower, middle, and upper levels respectively. The basis of this division will be discussed below.

ENVIRONMENT

The Coastal Plain Physiographic Province is a well-defined lowland that borders the coasts of the Gulf of Mexico and the Atlantic Ocean from Yucatan to southern New England (Atwood, 1940, p. 25). That part of it which extends from the Mississippi Alluvial Plain westward and southward along the Texas coast into Mexico is termed the West Gulf Coastal Plain (Fenneman, 1938, p. 100). It is this subarea with which we are presently concerned, for it is in this region that the Addicks Dam Basin is situated.

TOPOGRAPHY

The topographic features closely reflect the geological substructure. The coastal plain proper is nowhere very wide, not exceeding 100 miles in most areas. Sand reefs parallel the entire Texas coast, broken occasionally by shallow inlets to the lagoons that lie between them and the mainland. One of these expands into Galveston Bay (Atwood, 1940, p. 56) (fig. 4). From this young coast the land grades gently inland to a mature coastal plain which is a nearly featureless broad lowland. Shallow, wind-eroded pits, locally termed "blowouts" or "hog-wallows," and small clustered knolls of disputed origin occur in the area, but neither is of sufficient magnitude to relieve greatly the monotony of this level land (Plummer, 1932, pp. 792–793).

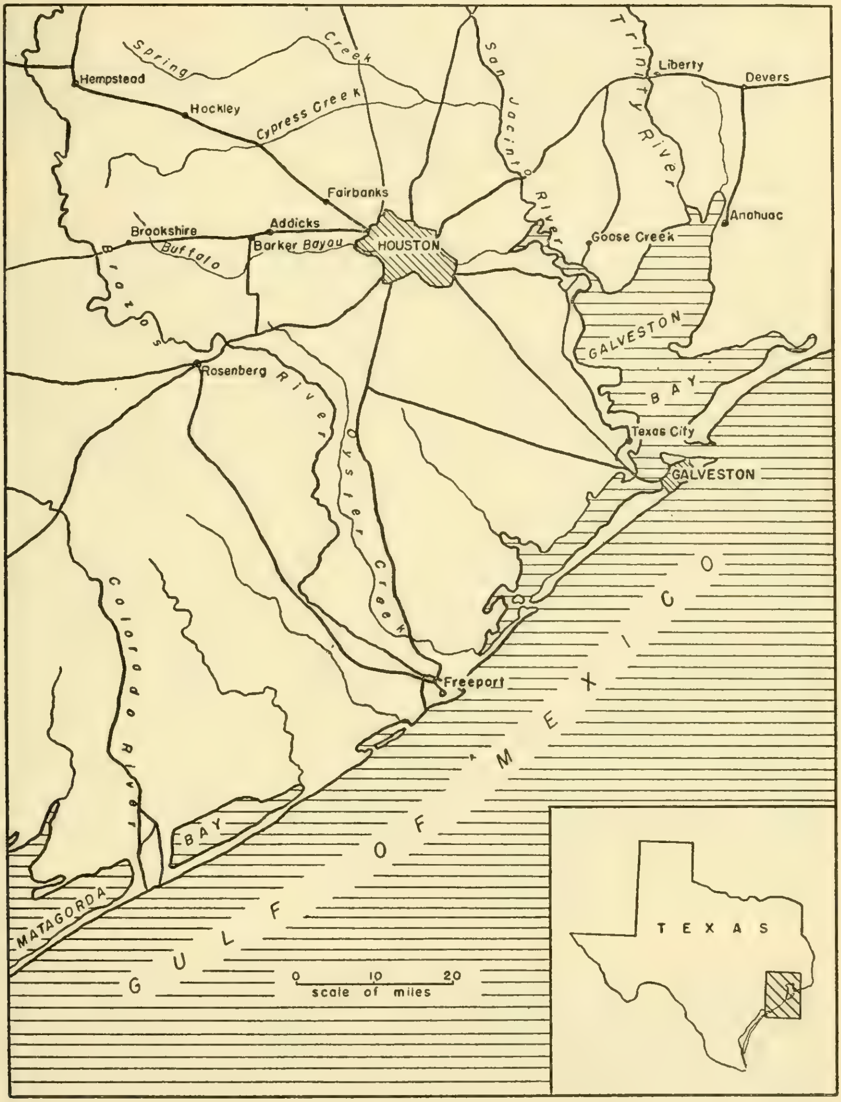

Spring Creek
Hempstead
Hockley
Cypress Creek
San Jacinto River
Trinity River
Liberty
Devers
Anahuac
Fairbanks
Brookshire
Addicks
Barker Bayou
Buffalo
HOUSTON
Goose Creek
Brazos
GALVESTON BAY
Rosenberg
River
Oyster Creek
Texas City
GALVESTON
Colorado River
Freeport
MEXICO
BAY
MATAGORDA
GULF OF
0 10 20
scale of miles
TEXAS

FIGURE 4.—Map of general area.

Inland from the low, swampy coast lies a belt of prairie covered with tall, deep-rooted grasses. A few trees are now found in this area, but true forest cover begins to the north and east, continuing throughout the eastward extension of the Coastal Plain Province.

The Addicks Dam Basin is situated about midway on this plain. Its mean altitude is about 30 m. (98.42 feet). A fringe of forest encompasses it, but a few miles farther south this finally gives way to the open prairie by which the Indians had easy access to the coast.

GEOLOGY

Geologically the area is a homoclinal structural plain, composed of overlapping formations which dip gently toward the coast. At their inner border they outcrop as a series of belts or low cuestas, roughly paralleling the coast. The older formations are marine in origin, having been laid down during periods of submergence, and are separated by erosional unconformities resulting from alternate periods of emergence and submergence. Since late Tertiary times the area has been above water for the most part (Chamberlin and Salisbury, 1930, p. 734), and the subsequent formations are largely of fluviatile deposition (Atwood, 1940, p. 57).

The present land surface of the coastal plain is Quaternary in origin. The Lissie formation, of Pleistocene age, unconformably overlies sands of Pliocene age and outcrops in a belt some 30 miles wide, bounded on the north by the Hockley Escarpment. Its southern boundary is formed by the unconformably overlying Beaumont clays of late Pleistocene age which extend nearly to the present coast. Unconformably overlying both the Lissie and the Beaumont formations over most of the plain is a topsoil composed principally of river deposits, while the present coastline is formed by wind- and marine-laid sands. Along the stream courses there are terrace deposits, also of recent age (Plummer, 1932, pp. 781–795).

DRAINAGE SYSTEM

The region is characterized by a young drainage system (Sutherland, 1908, p. 243). The older, pre-Pleistocene rivers, such as the Sabine, Neches, Trinity, Brazos, and Colorado, head upon the older formations of the interior and pass completely across the coastal plain, through which they have cut deep grooves (Fenneman, 1906, p. 12). Gravel bars of these streams furnished the Indians with a ready source of poor-grade flints. However, the water courses of the San Jacinto River, Buffalo Bayou, Clear, Oyster, San Bernard, and Caney Creeks, are confined to the plain itself or head at strong springs along its northern border, and hence are younger or post-Pleistocene (Fenneman, 1906, p. 12). Nevertheless, much of the area is poorly drained, and small ponds and lakes hold runoff water during the rainy season.

The stream courses are fringed by trees and are usually bordered by discontinuous natural levees in the form of sand and silt knolls which permit overflowing into the bottomlands adjacent to the channels. These sand and silt or clay knolls are quite noticeable along the water courses and occasionally occur on the plain where, as residual levees, they exist as a remnant of the plain's aggradation. It was on these natural knolls that the Indians established their camps.

Buffalo Bayou rises along the Waller-Harris County line, flows south and east through the northeastern part of Fort Bend County, and then eastward through a relatively deep and narrow channel to the city of Houston. From this point to its confluence with the San Jacinto River, the stream widens and today forms the upper part of the Houston Ship Channel which opens into Galveston Bay. It has a number of tributaries, the largest of which are Brays Bayou, White Oak Bayou, Greens Bayou, Turkey Creek, and South Mayde Creek.

The Addicks Dam Basin controls the flood waters of Turkey Creek and South Mayde Creek. Although Turkey Creek is an independent stream, and before the construction of the dam emptied directly into Buffalo Bayou, it is intermittent, and the volume of water it carries is small. The main tributary of South Mayde Creek is Langham Creek, which is itself fed by Horsepen and Bear Creeks. These streams flow through tree-bordered channels, the banks of which are, in places, thickly overgrown with thorny vines and underbrush. The channels are cut through the recent alluvial fill and into the Beaumont clay. While the streams are normally shallow and carry a small volume of water, they nevertheless afforded a permanent water supply for the Indians. During flood periods, however, these streams frequently overflow their banks and inundate wide areas of bottomland, so that the natural knolls and levees are at that time the only land above water. For this reason, they were important to the aboriginal inhabitants.

CLIMATE

The West Gulf Coastal Plain has a humid subtropical climate (Blair, 1942, p. 191). Long and hot summers are characteristic of the area, but summer winds from the Gulf relieve temperatures that occasionally soar above 38° C. (100° F.). During this period the relative humidity is about 70 percent, and the high temperatures during most of that time make for somewhat oppressive summers. During the winters the winds are variable, but frequently blow from the continental interior, bringing chilling weather in their wake. For the most part, however, the winters are mild and pleasant.

The climatological data from Houston may be summarized as being almost precisely that of the Addicks Dam Basin, since it lies only 16 miles to the east, at the same altitude above sea level, and about the same distance inland from the Gulf. The mean annual temperature is 20.61° C. (69.10° F.), with a range of 10° C. (30° F.). The coldest month, January, has a mean temperature of 11.83° C. (53.30° F.), and the warmest, July, 28.50° C. (83.30° F.). Eighty-one days have temperatures of 32.20° C. (90.00° F.) or above, and only 9 days have temperatures of 0° C. (32.00° F.) or lower. The growing season is 294 days. The wettest month is May, with 11.88 cm. (4.68 inches), and the driest is February, with 7.53 cm. (2.97 inches). Ninety-nine days have 0.025 cm. (0.01 inch) or more of moisture, and the average annual precipitation is 1.15 m. (46.00 inches) (Blair, 1942, p. 195).

BIOTA

The Austroriparian Biotic Province is characterized by the pine and hardwood forests of the southeastern United States. Numerous swamps and marshes occur along the coast and the inland waterways. Both mammalian and avian fauna of the area are characteristically rather dark in color and none of the mammals are known to hibernate in winter. This province includes that part of the West Gulf Coastal Plain which lies east of the 95th degree of longitude, swinging west to include the area immediately north and west of Galveston Bay (Dice, 1943, map facing p. 4, and pp. 18–21). On the west it is bounded by the Texan Province. The Addicks Dam Basin, then, lies just within the Austroriparian Province but within easy reach of the Texan. The fauna utilized by the aboriginal inhabitants, as borne out by the archeological remains, is transitional between these two zones, being primarily that of the eastern province, but having, in addition, some forms typical of the western. Ethnohistorical, as well as archeological, data testify that the Indians took advantage of this transitional position in their utilization of game.

Buffalo Bayou is the approximate boundary between the Broom Sedge and Water Grass Prairie fringing the coast and the oak-pine forest that extends north to the Red River. A few miles to the northwest a tongue of prairie grassland extends into a belt of oak-hickory forest that parallels, and forms the western border of, the oak-pine forest. The trees that primarily compose the oak-pine forest are the short-leaf pine (*Pinus echinata* Mill.), yellow oak (*Quercus velutina* Lam.), bitternut (*Hickoria cordiformis* (Wang) Britton), but other oaks and pines do occur (Shantz and Zon, 1924, p. 14).

The prairie cover is largely dominated by broom sedges (*Andropogon glomeratus*, *A. saccharoides*, *A. furcatus*), and switch grass (*Panicum virgatum*), which merges farther south with water grass

(*Paspalum* sp.) and finally with marsh grasses of the coast (Shantz and Zon, 1924, p. 17).

A varied fauna previously occupied the region but has been much decimated since the intensive settlement by Caucasians. The Virginia deer (*Odocoileus virginianus texanus*) and black bear (*Ursus americanus*) have virtually disappeared since the 1880's. A few of the smaller animals are still present, though not common. Some of these are the bobcat (*Lynx rufus texanus*), the raccoon (*Procyon lotor*), the gray and the western fox squirrels (*Sciurus carolinensis*, *S. niger rufiventer*), and a number of rodents. The copperhead (*Agkistrodon mokasen* Beauvois), the eastern rattlesnake (*Crotalus horridus* Linne), and the coral snake (*Micrurus fulvius fulvius* (Linne)), are present, as are many snakes of nonpoisonous varieties. Fish, clams, and turtles are present in most of the streams in the area, and while many birds are found, the Indians apparently made only limited use of them.

The environment with which we are concerned may be considered a relatively favored one. The regularity of topography, together with the stream and bay systems, made for easy passage from one area to another by land or water, while sheltered sites for encampment were plentiful. The native products of forest and plain were easily available and many forms of wild game could be found in this transitional zone. The exploitation of these varied resources was further aided by a mild climate and must have assured the aboriginal inhabitants of at least a minimal food supply.

ETHNOHISTORY

The relationship of the historic Indian occupants of an area to the proto- and prehistoric inhabitants may be of either of two classes. If the ethnohistorical evidence indicates a cultural similarity to the archeological evidence, not explainable entirely in terms of environmental factors, then it may be reasonable to assume an ethnic, or at least a cultural, continuum. If, however, the evidence points to a hiatus or a severe modification between the archeological and the ethnological sequence, one must consider that ethnic or cultural movements have transpired and that it is not safe to infer a direct relationship between the two. For this reason, it seems wise to ascertain the cultural attributes of the historic peoples of the area to as full an extent as they may be useful in determining whether such a cultural continuum does exist.

Furthermore, an ethnohistorical insight into the nature of the relationships between the Indians themselves, and between them and the Europeans with whom they came in contact, may shed light on problems reflected in the archeological data only by tangible, imperishable artifacts without the human context.

Although some of the tribes living about Galveston Bay were among the first of the native American peoples to come in contact with the Europeans, the data preserved to us from the period are singularly vague and scanty. Not until the beginning of the Mission Era in the middle eighteenth century do we have full reports of the area, and these are principally concerned with the governmental, political, and religious aspects of the Spanish colonization and, therefore, shed little light upon the ethnological problems which face us. There are, however, many documents in the archives of Spain, France, Mexico, Texas, and Louisiana which, when translated, edited, collated, and published, may well illumine some of the lacunae in our knowledge.

EARLY EXPLORATION OF THE GALVESTON BAY AREA

On November 6, 1528, a boatload of survivors of the Narvaez expedition was cast ashore on the western end of an island which they named Isla Malhado, purportedly the present Galveston Island. Alvar Nuñez Cabeza de Vaca, one of the shipwrecked men, in his narrative of the expedition, gives us the first report of the Indians of the region; for although Alonzo de Piñeda, in the service of Francisco de Garay, had sailed along the Gulf Coast in 1519, making a map and claiming the land for the Spanish Crown, he left no records of the inland groups (Castañeda, 1936, pp. 7–8).

For a period of 6 years, De Vaca lived among these peoples, part of the time as a slave, later as a trader and healer, finally to escape to Mexico where he arrived, with three companions, in the year 1536 (Hodge, 1907, pp. 5–7). It is difficult to use the data afforded by De Vaca's chronicle because of its vagueness from an ethnological point of view. Some of his statements are at variance with later information, assuming that the identification of Isla Malhado as Galveston Island is correct, and that the Indians called Han and Capoques were respectively the Akokisa and the Cocos, as suggested by Hodge (1907, note 4, p. 54). The fact that the narrative was written several years after most of the action had taken place may well explain some of the seeming discrepancies.

Following the sojourn of De Vaca was a period of nearly a century before the Indians in the vicinity of the Bay were again visited. During that time De Soto explored a considerable part of the southeastern United States, and his successor, Moscoso, in the year 1542, visited the Hasinai territory to the north (Swanton, 1946, pp. 39–59). La Salle established his colony on Matagorda Bay and in 1686, and again in 1687, passed near, if not across, the headwaters of Buffalo Bayou in his attempt to reach the French settlements in Canada (Castañeda, 1936, map following p. 444). Alonso de Leon, Jr., likewise passed through the area in his fourth and fifth entradas in the years 1689 and 1690 (Castañeda, 1936, map following p. 444). None of these expeditions resulted in information concerning the natives of the Galveston Bay area.

Simars de Bellisle, a young French officer, landed with four companions on the Texas coast at Galveston Bay late in the year 1719. During the ensuing weeks, all but De Bellisle perished of hunger. Following the death of his companions, he joined a group of Indians who enslaved him and subjected him to many inhumanities. After some time he was given to a widow as a husband, but nevertheless continued to serve as a slave. Through the intervention of some Hasinai Indians, he was rescued and returned to the French settlement of Nacatoches on February 10, 1721 (Folmer, 1940, pp. 204–225).

From the account of De Bellisle, one gains a general picture of the manner of life of his captors. Like De Vaca's narrative, De Bellisle's report suffers from the paucity of specific data necessary for the reconstruction of a full cultural picture. Nonetheless, most of his story is borne out by later research.

In August 1721, De Bellisle returned to Galveston Bay with Bernard de la Harpe in the ship *Subtile*, commanded by Jean Berenger. With De Bellisle as his guide, De la Harpe landed and contacted the Indians, requesting permission to establish a settlement. The denial of this request by the Indians, because they feared reprisal for the ill-treatment meted out to De Bellisle, led De la Harpe to carry away nine of them to New Orleans (Folmer, 1940, pp. 204–225). Simars de Bellisle called these Indians among whom he had lived "Caux," but their almost positive identification as Akokisa rests on the vocabulary taken down by Berenger from the nine Indians taken on board the *Subtile* (Swanton, 1946, p. 85).

In 1727, the engineer, Alvarez Barreyro, crossed the area in execution of orders by General Rivera, who was then making an inspection of the northern frontier of New Spain, but the trip had no permanent results in the form of ethnographic data (Bolton, 1914, vol. 1, p. 52).

Rumors of French incursion in the neighborhood of Galveston Bay at last stirred the Spanish to concerted action, and in 1745 Capt. Don Joaquin de Orobio Bazterra was dispatched to investigate. In the early months of 1746 he arrived among the Bidais and a short time later among the Akokisa. Here the rumors were confirmed to the extent that French traders annually came into the territory to buy skins and to supply the Indians with needed commodities. Orobio Bazterra found no permanent French settlement, but the promise of one perhaps prompted a second visit to the area later the same year (Bolton, 1915, pp. 328–332).

FOUNDING OF THE MISSIONS

The founding of three missions on the San Gabriel River—San Francisco, Nuestra Señora de la Candelario, and San Ildefonso—took place during 1749. Although these missions are not in the immediate region of Galveston Bay, the last named concerns us briefly, since it was at San Ildefonso that the Akokisa, Bidais, and Deadoses, all of the Attakapa linguistic stock, were first congregated. After several years of trouble and dissension between the religious and the military, the missions were finally abandoned in the summer of 1755 (Bolton, 1915, pp. 50–55).

During the previous year a French trader, Joseph Blancpain, and four companions were arrested by the Spanish in the village of El Orcoquisac on the lower Trinity River. Governor Barrios sent Domingo del Rio among the Akokisa and the Bidai with gifts and instructions to investigate the reaction of the Indians to the arrest of the Frenchmen. The report of Del Rio caused Barrios to dispatch a garrison to El Orcoquisac, which took up its post late in 1755 (Bolton, 1915, pp. 337–342).

The following year a presidio named San Agustin de Ahumada was established in the Indian town of El Orcoquisac, a few leagues above the mouth of the Trinity. A mission was established nearby and given the name Nuestra Señora de la Luz. (It is interesting that 50 Tlascalan Indian families from Mexico were then settled there.) Fifteen years of hardship, turmoil, strife between religious and military, and constant threat of relocation ended in 1771 with the final abandonment of both presidio and mission (Bolton 1915, pp. 342–374).

Following the withdrawal of the Spanish, French traders again came into the area, and the English began shortly thereafter to make overtures to the Indians. By 1805 the main town of the Akokisa was reported to be on the west side of the Colorado River, and they then disappear from the records (Swanton, 1946, p. 86).

THE HISTORIC INDIANS AROUND GALVESTON BAY

The identity of the Indian tribes inhabiting the lower Trinity River and the region to the north and northwest of the Bay may be inferred with considerable surety. The Han, who occupied the eastern end of De Vaca's Isla Malhado, are believed to be the Akokisa, the name "Han" being a synonym for the Attakapa and Akokisa word for house (Swanton, 1946, p. 85). The Capoques, occupying the western end of the island, were probably the Cocos of Karankawa affiliation (Hodge, 1907, p. 54). That De Bellisle's captors were Akokisa seems certain, since our sole vocabulary of this language was recorded by

Berenger from the nine Indians of this group who were carried back to New Orleans by De la Harpe (Swanton, 1946, p. 85). Orobio Bazterra is explicit as to the identity of the Indians around the mouth of the Trinity and to the north and west. From Orobio Bazterra's data, Bolton identifies the location of the four or five rancherias of these people as along Spring Creek, which parallels Buffalo Bayou a few miles to the north, and, like it, empties into the San Jacinto (Bolton, 1915, p. 333). The Bidai, who occupied territory farther inland to the northwest, told Orobio that the Akokisa ranged from the Neches River to a point halfway between the Trinity and the Brazos (Bolton, 1915, note 14, p. 334). Most of the contemporary maps are also explicit in the location of the Akokisa and other coastal and inland tribes (Pichardo, 1931, cf. maps following pp. 350, 388, 474; Bolton, 1915, pp. 350, 382). The Attakapa, of whom the Akokisa are western relatives, extend eastward into southwestern Louisiana. Swanton places the Patiri, Bidai, and Deadose, all related to the Akokisa, along the upper course and tributaries of the San Jacinto and Trinity Rivers (Swanton, 1946, map following p. 1). The Mayeye lived west of the Bidai, and south of the Bidai, toward the coast, lived the Cocos, of Karankawan stock. By 1779, according to Morfi, these tribes had united and established themselves on the coast between the Colorado and the Brazos (Morfi, 1935, p. 81). Occupying the coast, westward from the mouth of the Brazos, were the Karankawa (Gatschet, 1891, pp. 45–46, and map following p. 46). Some place them as far east as the west side of Galveston Bay. From the evidence cited above, it appears that the sites of the Addicks Basin fall within the geographic range of the Akokisa.

THE CULTURE OF THE GALVESTON BAY INDIANS

Swanton states that:

> The Attakapa, although upon the coast of the Gulf of Mexico, were actually just beyond the southeastern area proper. Along with the tribes westward of them, to and beyond the Rio Grande, they were characterized by a loose organization, a low culture, and the existence of cannibalistic practices in something more than merely ritual form. [Swanton, 1928, pp. 712–713.]

The annual economic cycle of the Akokisa and the related tribes was simple, the search for natural food determining their location. The winter season was passed in permanent or semipermanent camps. De Vaca says that because of the weather they " . . . retire to their huts and ranches, torpid and incapable of exertion" (Hodge, 1907, p. 57). De Bellisle also infers this, and describes the summer as a period of wandering in search of food "because they possess no cabins or fields" (Folmer, 1940, pp. 216–217). Bolton (1915, p. 334) says that they went periodically back and forth between coast and interior with the changes of the season, although they lived in relatively fixed villages. Orobio Bazterra reported in 1745 that they lived in "villages" (Bolton, 1915, p. 330). It can be seen that, in general, these tribes were transitional between the southeastern pattern and that of the coastal groups to the southwest.

Hunting, fishing, and gathering formed the main subsistence pattern. These tribes appear to have had little or no agriculture, at least until the time of Orobio. Deer, bear, and occasionally bison were hunted, and it is interesting to note that by 1719 they had adopted bison hunting from horseback (Folmer, 1940, p. 219). De Bellisle mentions the gathering of bird eggs in quantity, and the use of shellfish is noted by him as well as by De Vaca. Edible roots, "wild potatoes," are noted by both (Folmer, 1940, p. 215 et seq.; Hodge, 1907, p. 45 et seq.), and many other kinds of wild plants were undoubtedly utilized.

Cannibalism is affirmed by De Bellisle and many other later writers (Folmer, 1940, p. 219; Swanton, 1928, pp. 712–713), so that it is somewhat surprising that De Vaca states that the Indians were appalled when the Spaniards, of necessity, ate each other (Hodge, 1907, pp. 49–50). It does not seem likely, however, that cannibalism was economically important.

The type of housing used by the Akokisa may only be inferred. De Bellisle states that they had no "cabins," but this statement may refer only to their summer rounds. Moreover, he may have used the term in the European sense of a permanent wooden or stone structure. De Vaca mentions "houses of mats," but the reference is so general that it does not greatly clarify the problem (Hodge, 1907, p. 52). Orobio Bazterra speaks of the Bidai winter habitation as bearskin tents (Bolton, 1915, p. 330), and, since the Bidai are relatives of the Akokisa, it seems safe to infer that some similar form prevailed there.

Pottery is mentioned by both Cabeza de Vaca and De Bellisle, but neither gives the provenience or details of shape, size, or decoration of the vessels. Swanton (1946, p. 737) states that the Attakapa received most of their pots in exchange for other products from either the Karankawa or the Avoyel, and probably from the Caddo also. Flint was obtained from the Avoyel and passed along to the Karankawa. Trade was also carried on with some of the interior peoples, as De Vaca points out (Hodge, 1907, pp. 56, 61).

Social organization and nonmaterial culture have been described in some detail elsewhere, by Bolton (1914, 1915), Swanton (1911, 1928, 1946), Gatschet (1891), De Vaca (Hodge, 1907), De Bellisle (Folmer, 1940), and others. Since these subjects are not of primary concern for the purpose of this paper, the reader is referred to the original sources.

DESCRIPTIONS OF ADDICKS BASIN SITES

Nine sites were recorded during the survey of the Addicks Dam Basin and the associated outlet channel construction (fig. 5). Three of these sites are on the main channel of Buffalo Bayou, three on South Mayde Creek, and the remaining three on Langham Creek. No sites were located on Bear Creek or Turkey Creek within the area surveyed, and it seems likely, because of their relatively small size and the re-

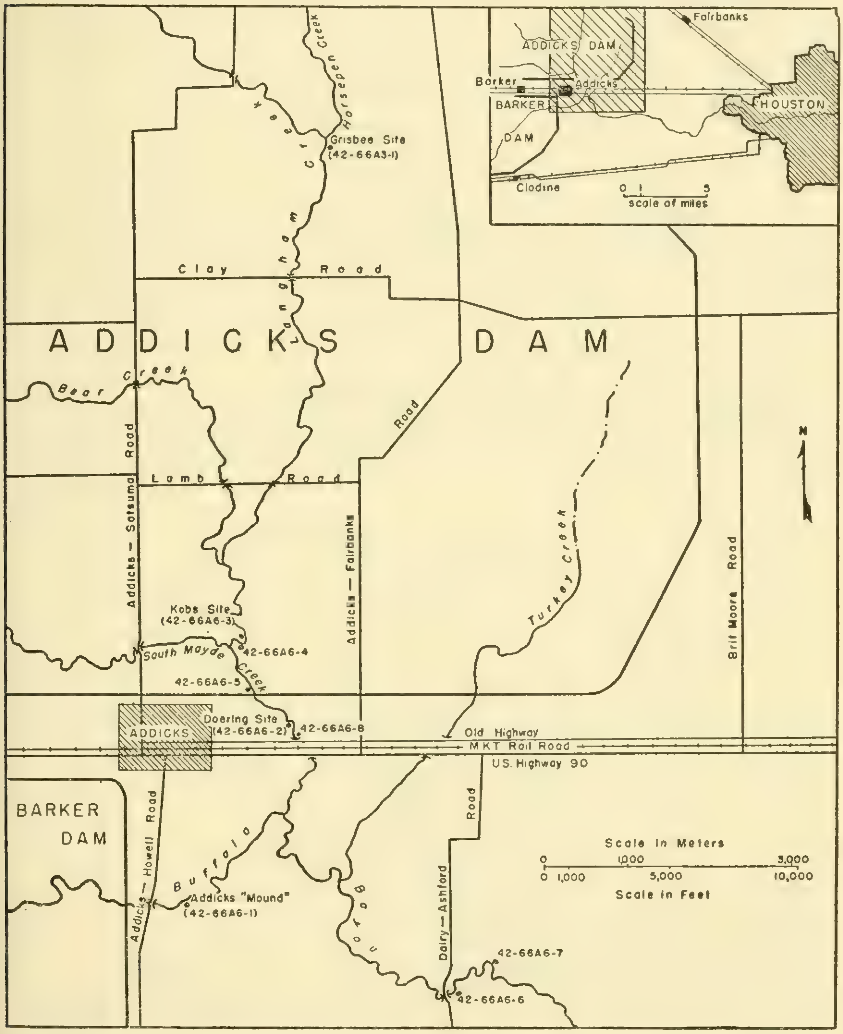

Fairbanks
ADDICKS DAM
Barker
Addicks
BARKER
HOUSTON
DAM
Clodine
0 1 5
scale of miles
Horsepen Creek
Langham Creek
Grisbee Site
(42-66A3-1)
Clay Road
ADDICKS DAM
Bear Creek
Road
Lamb Road
Addicks — Satsuma Road
Addicks — Fairbanks
Turkey Creek
Brit Moore Road
N
Kobs Site
(42-66A6-3)
South Mayde Creek
42-66A6-4
42-66A6-5
Doering Site
(42-66A6-2)
42-66A6-8
ADDICKS
Old Highway
MKT Rail Road
US. Highway 90
BARKER
DAM
Addicks — Howell Road
Buffalo Bayou
Addicks "Mound"
(42-66A6-1)
Road
Dairy — Ashford
Scale in Meters
0 1,000 3,000
0 1,000 5,000 10,000
Scale in Feet
42-66A6-7
42-66A6-6

FIGURE 5.—Map of site distribution with inset showing relation of Addicks Dam, Barker Dam, and Houston, Tex. Wide-hatched area on inset shows zone covered by main map.

stricted amount of water carried by them, that they were not commonly used as permanent camping areas. The survey was largely concentrated in those areas where it seemed probable that damage from construction, silting, or indiscriminate digging might occur.

The three sites located on Buffalo Bayou are the Addicks or Habermacher "Mound" (42/66A6–1), upstream from the Buffalo Bayou-South Mayde Creek confluence, and sites 42/66A6–6 and 42/66A6–7, downstream from this confluence in the order named.

THE ADDICKS "MOUND" (42/66A6–1)

The Addicks "Mound" (42/66A6–1) was not an artificial mound but rather an extensive midden deposit located on the south side of the main channel of Buffalo Bayou (figs. 5, 6). Before the channel rectification program for Barker Dam changed its course, the stream locally took a northeasterly direction for about a mile to its confluence with South Mayde Creek. The midden accumulation, 1.28 m. (4.20

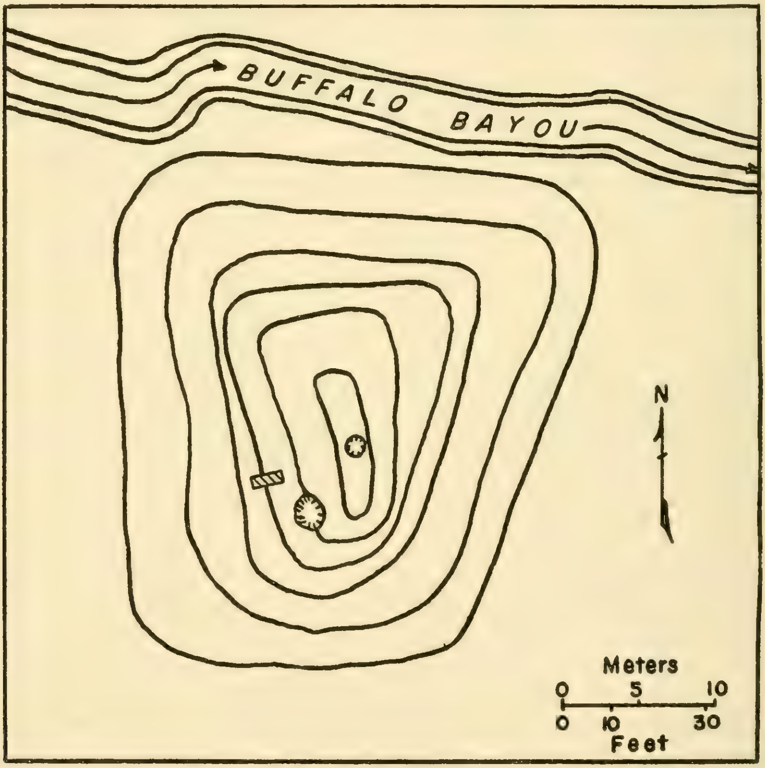


FIGURE 6.—Sketch map, Addicks "Mound" (42/66A6–1).

feet) thick, rested on a natural clay knoll. The combined height of midden and knoll above the surrounding land surface was approximately 1.82 m. (6.00 feet). On its north-south axis the site measured 33.52 m. (110.00 feet) and on the east-west axis 30.48 m. (100.00 feet). A few meters to the southwest of the midden was a small linear depression, probably a segment of an old stream channel. About 20.00 m. (65.61 feet) to the east, the main channel of the Bayou was joined by a northeasterly flowing shallow slough. Several large oaks were growing on the midden itself, and the bottom land of the valley floor supported a number of hardwood trees, pines, and some undergrowth of bushy shrubs.

For a number of years past, the midden had been known as an Indian "mound" by local farmers and collectors from Houston and neighboring towns. Sporadic digging for collecting purposes had been carried on by several individuals. Stanley Morse, one of the collectors, brought the site to the attention of W. M. Black, an engineering student of Houston.

In 1941 Mr. Black made a small excavation to a depth of about 30 cm. (0.98 foot) which resulted in the finding of a few projectile points potsherds, and other midden debris such as animal bone and mussel shell.

Early in 1942, when it became obvious that channel rectification work would result in damage to the site, Black returned, surveyed the site, and prepared a contour map (fig. 6). He then made a second excavation. This pit was 60 cm. (1.96 feet) wide, 1.80 m. (5.90 feet) long, and penetrated the sterile clay underlying the midden. This was reached at a depth of 1.28 m. (4.20 feet). The pit was excavated in arbitrary levels averaging 15 cm. (0.49 foot), and the material recovered was segregated by the level. Some of this material was given to the Smithsonian Institution by Mr. Black and is included in this report.

No definite stratification was noted by Black. However, he describes the midden fill as "loose, black loam." Numerous bone fragments, clamshells, small gastropods, and pieces of turtle carapace and plastron occurred in the fill. Pottery was reported as abundant in the upper part, occurring less frequently toward the bottom of the midden. (The segregated sample donated to the Smithsonian contained no pottery from the lowest levels.) Projectile points in the upper 15–30 cm. (0.49–0.98 foot) included small arrow points—Perdiz Point Stem and Scalhorn Stemmed—and the larger Gary Stemmed points. None of the smaller points were found below this depth.

In May 1942, a third excavation by Mr. Black resulted in the finding of a burial.

Burial No. 1:

Location: Test pit 3.

Position: Semiflexed on right side; head oriented to northeast, face twisted back and down.

Arms: Folded in front of chest with hands to chin.

Legs: Loosely pulled up at about right angle to body with feet close against pelvis.

Age: Adult.

Sex: Male (?).

Associated objects: A large gray flint knife 63 mm. (0.206 foot) wide by 202 mm. (0.66 foot) long, placed between the parallel forearms. Remains of what appeared to be seed or perhaps wooden beads were found in the chest region.

Remarks: Bone condition was good.

During the completion of the Barker Dam outlet works, the midden was razed and the material placed in a dump heap. It was later covered by the embankment of the rectified channel. The site is now virtually destroyed, only about 30 cm. (0.98 foot) of the midden base remaining in situ exposed in the channel face.

SITE 42/66A6–6

Site 42/66A6–6 lies about 2 miles downstream on the main channel of Buffalo Bayou and almost directly east from the Addicks "Mound" (fig. 5). This is a small midden, 22 m. (72.17 feet) long on a north-south axis by 12 m. (39.37 feet) on an east-west axis. It rests on a low, broad, natural sandy rise on the south bank of the bayou where the stream turns into a north meander through open woods of oak, willow, and a few pine.

A small test pit, made to ascertain the depth of deposit and nature of the fill, resulted in the recovery of several plain ware potsherds. No projectile points or other stone artifacts were found, although flint chips occurred in the deposit. No stratigraphic test was made because of the objection of the tenant; moreover, the midden would not be damaged in the channel rectification since the new channel was projected to pass some distance to the north, isolating the site on a dry meander.

Two hundred meters (656.16 feet) to the west, in a formerly cultivated field, a surface camp site was reported but could not be verified upon investigation.

SITE 42/66A6–7

A short distance downstream from site 42/66A6–6 Buffalo Bayou makes a small horseshoe bend toward the north. Sixteen meters (52.49 feet) east of where the bayou turns south again, on the north side of the stream, is a low, sandy knoll, 22 m. (72.17 feet) on its north-south axis by 16 m. (52.49 feet) on its east-west axis. The site number 42/66A6–7 was assigned to this knoll (fig. 5). It had been intermittently used by the Indians as a camping place, but occupation was never of sufficient duration or continuity to result in the formation of a midden.

From the grass roots to a depth of 15 cm. (0.49 foot), sparse camp debris occurred in the sand. One potsherd and a few unaltered flint chips comprise the collection made at this site.

Below its confluence with Langham Creek, South Mayde Creek flows in a general southeasterly direction for about 1,850 m. (6,069.53 feet), then curves sharply to the southwest to flow some 750 m. (2,460.62 feet) before emptying into Buffalo Bayou. Three sites are located on South Mayde Creek. These are: Site 42/66A6–8, the Doering site (42/66A6–2), and site 42/66A6–5, upstream in the order named.

SITE 42/66A6–8

Site 42/66A6–8 is a small surface camp on the east bank of the creek approximately 100 m. (328.08 feet) north of the Missouri, Kansas, & Texas Railway bridge (fig. 5). Scant camp debris is eroding from grass-root level over an area of about 5 m. (16.40 feet). Further testing was not undertaken because of the superficial nature of the deposit.

THE DOERING SITE (42/66A6–2)

The Doering site is located some 200 m. (656.16 feet) northwest of site 42/66A6–8 (fig. 5). A short slough joins South Mayde Creek at this point, and the stream veers to the northeast for about 100 m. (328.08 feet) before resuming its normal southeasterly course. The north bank is somewhat lower than the south. It is composed principally of a reworked sandy deposit which is brush covered and supports a few willow trees (fig. 7). Beyond these, on higher ground, are oaks and other hardwood trees. The south bank forms a low escarpment. The site consists of a midden deposit 1.20 m. (3.93 feet) in depth overlying the clay which is the main constituent of the escarpment. The midden rises about 75 cm. (2.46 feet) above the surrounding area, the bottom of the midden being 45 cm. (1.47 feet) below the level of the adjacent bottom land. It is 36.50 m. (119.75 feet) long on an axis parallel to the stream, and 16.50 m. (54.13 feet) across on the north-south axis. Open forest surrounds the site, while several pines and a few oaks, some of which attain a diameter of 30 to 40 cm. (0.98 to 1.31 feet), grow on the midden itself. There is less undergrowth on the site than is usual along the stream banks, probably because of the better drainage afforded by the slope of the midden.

The highest part of the midden is westward of the center and immediately adjacent to the creek. From here it slopes gently to the east

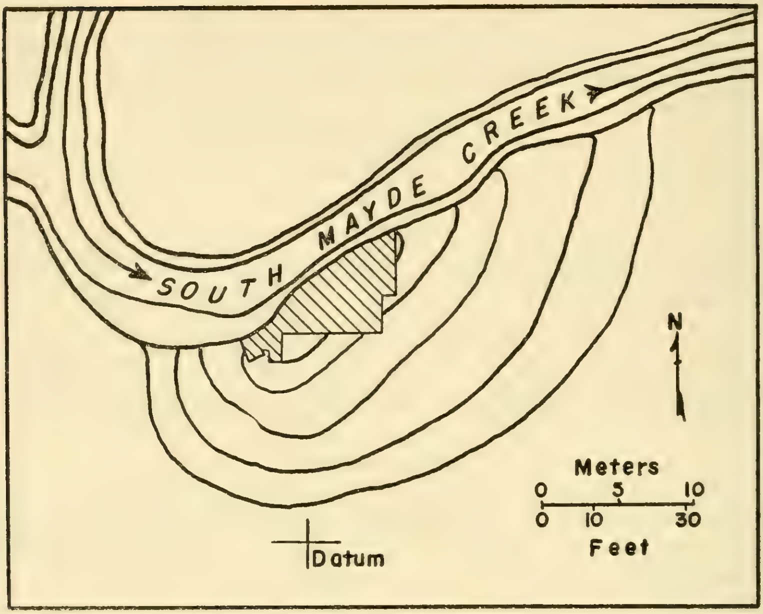


FIGURE 7.—Sketch map, Doering site (42/66A6–2). Hatched area denotes area excavated.

and south, and somewhat more steeply to the north and west. Along the creek bank the midden deposit is exposed in a vertical face where the southward cutting action of the stream during flood conditions has resulted in the dissolution of a considerable portion of the site. The midden soil thus precipitated into the flood waters was transported in suspension. Heavier components, however, such as potsherds, ground and flaked stone artifacts, and a quantity of stone debris, found lodgement in irregularities of the stream bed. A search of the stream bed during low water yielded about 700 artifacts which will be referred to as the "stream bed collection." While these are not useful for stratigraphic purposes, they extend the typological range of some of the material classes found in situ in the midden. Several of the types were not duplicated in any of the excavations, however, and their exact stratigraphic relationships must await further research in the area.

At one time the midden had been used as a barnyard, the highest part being occupied by a pigpen. This structure was carried away by a flood several years ago, and there remained no surface indication of its ever having been there. Several iron nails found in the upper few centimeters of the deposit, however, may be attributed to this source.

A large tree on the south side of the site was chosen for a datum point, and a north-south base line was established from this datum through the center of the site to the creek scarp (fig. 8). The site was laid out in a grid of 1 m. (3.28 feet) squares numbered from the datum north along the base line and east or west along lines intersecting the base line at right angles. The stake nearest the datum became the designator for that square. Excavation was by arbitrary levels of 15 cm. (0.49 foot). All material from each 15 cm. (0.49 foot) level and 1 m. (3.28 feet) square was screened and the artifacts segregated.

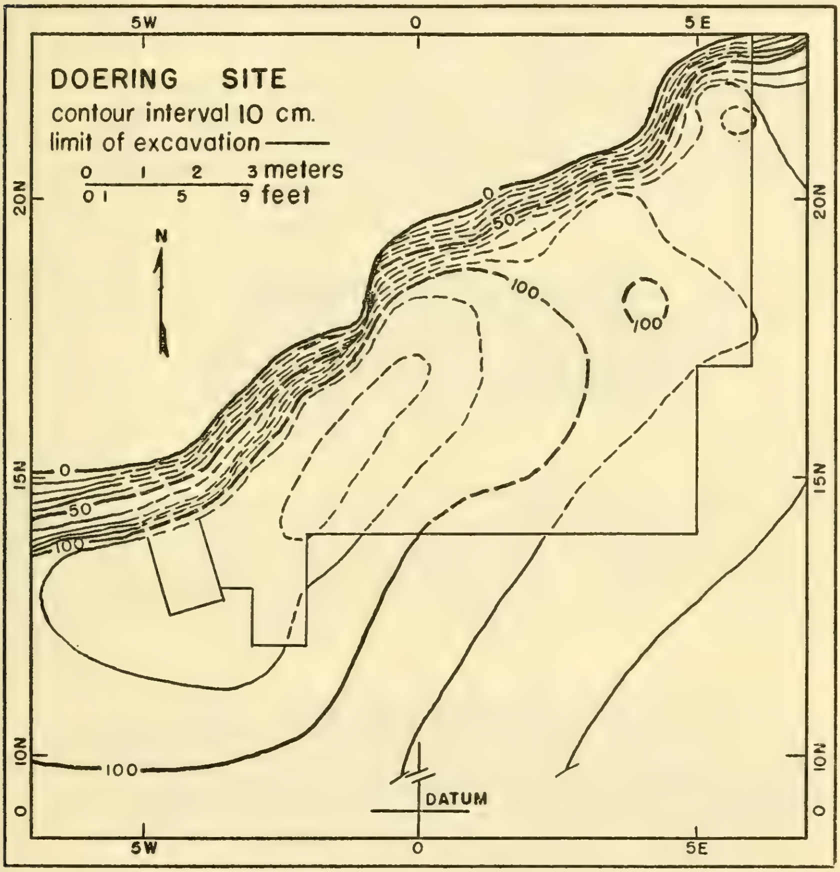
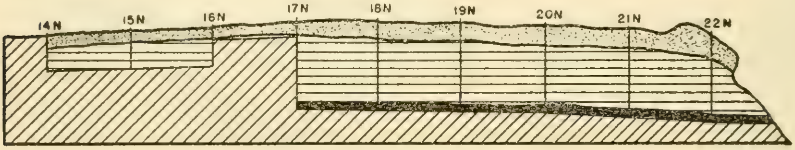

DOERING SITE
contour interval 10 cm.
limit of excavation
0 1 2 3 meters
0 1 5 9 feet
N
5W
0
5E
20N
15N
10N
0
0
50
100
DATUM

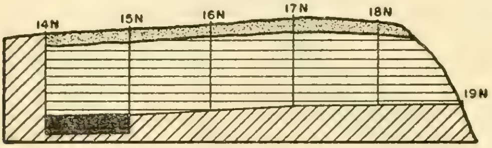
Figure 8.—Contour map and plan of excavation, Doering site (42/66A6–2).

Depth was measured from surface at the level of the designator stake for that square. Because of the relatively gentle slope of the midden this system, in effect, resulted in the peeling of the deposit in 15 cm. (0.49 foot) layers. Profiles were measured by the use of a carpenter's hand level, the drop or rise being measured from each stake with a rigid steel tape. These profiles were then plotted on graph paper, the profiles along 0E/W, 14N/S, and 17N/S being used as controls for the construction of a contour map (fig. 8).

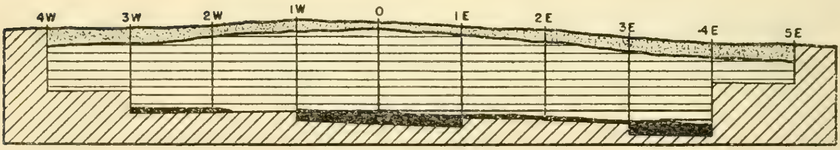
The physical stratigraphy of the Doering site is simple (fig. 9). From the surface to a depth of 20 cm. (0.65 foot) the deposit consists of midden soil, sandy in texture, light tan in color, and quite friable. The lightness of color may be the result of weathering out or bleaching of the humic content by oxidation in place. However, occupation, judging from the artifact content, seems to have been less frequent or of lesser density during the deposition of this material, and the color may, therefore, be the result of less inclusion of organic matter.



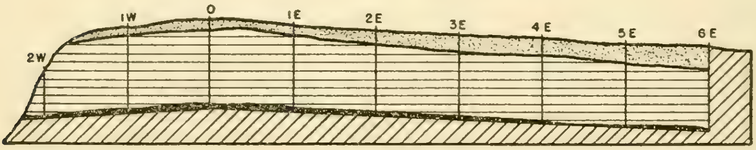
PROFILE AT 5 EAST



PROFILE AT 0 EAST-WEST



PROFILE AT 14 NORTH



PROFILE AT 17 NORTH

Figure 9.—Profiles, Doering site (42/66A6-2). Light stippling, weathered midden zone; horizontal hatching, midden deposit; black, sterile clay knoll; diagonal hatching, unexcavated.

Below 20 cm. (0.65 foot) the organic discoloration of the midden increases to the depth of 75 cm. (2.46 feet). There is less sand admixture, and clay content increases. From 45 to 75 cm. (1.47 to 2.46 feet) the midden is somewhat indurated, and this zone marks the period of the most concentrated occupation. Animal bone fragments, including human bones, were most frequent at this level, although they occur in considerable quantity in the lower levels as well.

From 75 cm. (2.46 feet) to the bottom of the midden deposit the soil is dark in color, heavy in consistency, and contains much moisture, making it difficult to screen. It is primarily of clay with decreasing organic content near the base of the deposit. A blending of the midden soil with the upper part of the clay knoll upon which it rests masks the precise transition from the one to the other. Below 1.20 m. (3.93 feet) the clay, which is devoid of artifacts or other occupational debris, is dense and indurated, of yellow color, and contains ferrous inclusions in the form of pebbles and root molds. It underlies the midden to the bottom of the creek and to an unknown depth below.

Artifacts were relatively fewer in the level from grass roots to 20 cm. (0.65 foot). Projectile points of Perdiz[1] Pointed Stem, with its related types, and Gary Stemmed were present in about equal quantities. Pottery was predominant over lithic material.

Below 20 cm. (0.65 foot) and down to 90 cm. (2.95 feet), the Gary Stemmed points numerically predominated over other types. At 90 cm. they were replaced in frequency by expanding stem forms. Pottery was relatively abundant to a depth of 75 cm. (2.46 feet). Below this depth, however, it was absent or extremely rare.

Four burials were found in the Doering site. Three of these were flexed while the other was loosely semiflexed. Although all of these interments probably were made in pits, it was not possible to define them, except in Burial 3, because of the homogeneity of the midden deposit. This burial was intrusive through the lower part of Burial 2, and in that section where it cut through the earlier burial, an arc of the pit was defined by the bones removed. No artifacts were definitely associated with any of the burials. Bone condition was uniformly poor, probably due to soil conditions.

Burial No. 1 (fig. 10, *a*):

Location: 18N/0E and 18N/1E.
Depth: 90 cm. (2.95 feet) to skull.
Matrix: Midden earth.
Position: Semiflexed on right side; head oriented to east, facing north.
  Arms: Upper right arm along side, entire lower arm absent; left arm loosely folded across the abdominal region; hands missing.
  Legs: Right leg loosely flexed; left leg on top of right leg; feet missing.
Age: Adult.
Sex: Female (?).
Associated Objects: A number of deer bones and two broken flint artifacts occurred near the burial, but probably represent midden debris rather than intentional burial offerings.
Remarks: This burial was much disturbed, the skull broken and scattered over an area about 1 m. (3.28 feet) square. Many bones were missing and the rest fragmentary.

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[1] See chapter on Material Culture for complete information on these named projectile point types.

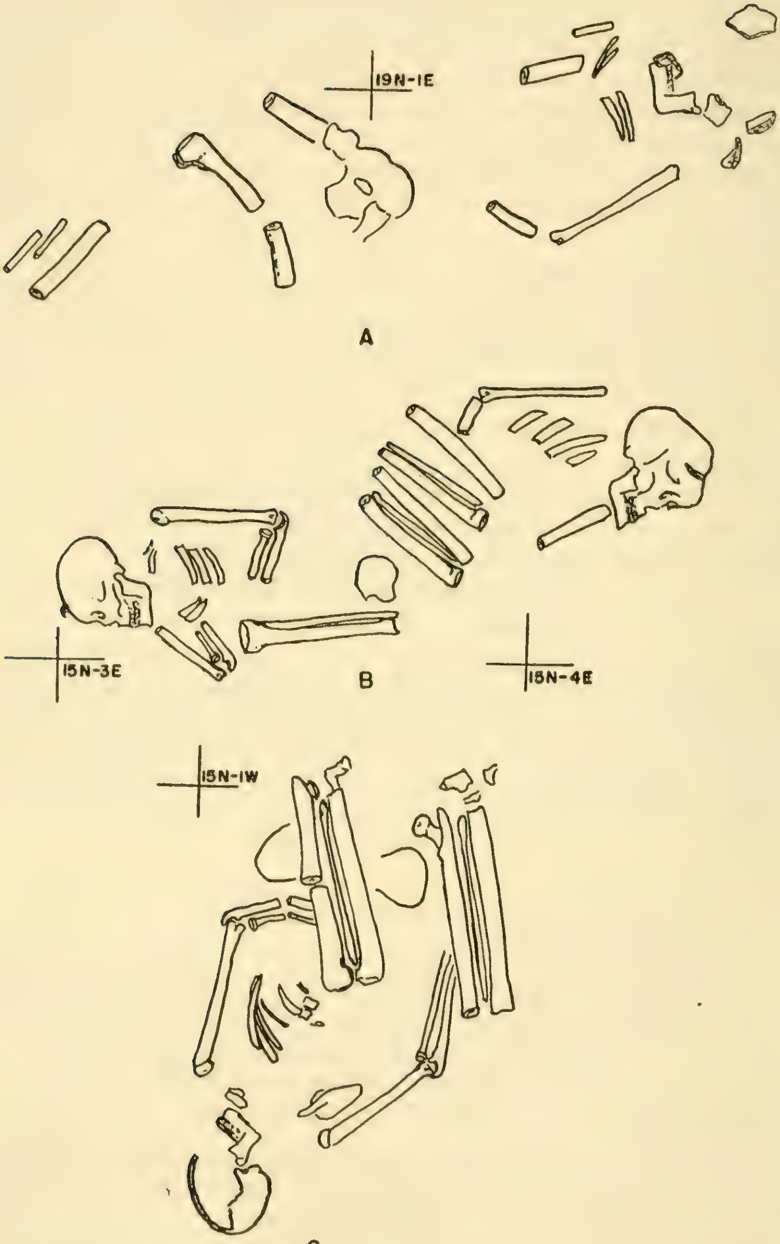

19N-1E
A
15N-3E
B
15N-4E
15N-1W
C

FIGURE 10.—Burials, Doering site (42/66A6-2). *A*, Burial 1. *B*, Burials 2 and 3. *C*, Burial 4.

Burial No. 2 (fig. 10, *b*):

Location: 15N/3E.

Depth: 32 cm. (1.04 feet) to skull.

Matrix: Midden earth.

Position: Tightly flexed on back; head oriented to west, facing south.

Arms: Right arm folded closely over the right leg; left arm loosely folded, probably over the left leg at time of interment; both hands missing.

Legs: Right leg pulled tightly back against body; left leg and left innominate bone removed at time of intrusion of Burial No. 3.

Age: Adult.

Sex: Female.

Associated Objects: None.

Remarks: The lower left part of the body of this burial had been removed by the intrusion of the pit for Burial No. 3.

Burial No. 3 (fig. 10, *b*):

Location: 15N/3E–15N/4E.

Depth: 33 cm. (1.08 feet) to skull.

Matrix: Midden earth.

Position: Flexed on left side; head oriented to east, facing south.

Arms: Right arm placed across the legs; left arm incomplete, only a fragment of humerus represented; hands missing.

Legs: Right leg on top of left leg, both pulled against body.

Age: Adult.

Sex: Male.

Associated Objects: None.

Remarks: This burial was inhumed in a pit intrusive through the lower left side of Burial No. 2. Large roots penetrating the skull had forced it apart at the sutures and elsewhere had broken the long bones.

Burial No. 4 (fig. 10, *c*):

Location: 14N/0W.

Depth: 33 cm. (1.08 feet) to skull.

Matrix: Midden earth.

Position: Loosely flexed on back; head oriented to southwest, facing northwest.

Arms: Right arm alongside the body and partially underneath the right leg; left arm folded across the lower part of the body under the legs.

Legs: Both legs loosely flexed to the right side of the body.

Age: Adult.

Sex: Male.

Associated Objects: A large double-pointed drill was found beneath the body, but was not certainly included as grave goods.

Remarks: Some of the bones were penetrated by root growth, but the preservation was generally better than that of any other burial from this site. Several of the long bones displayed pathological growths and lesions.

SITE 42/66A6–5

Neither the precise location nor the nature of site 42/66A6–5 is known, since it was destroyed as a consequence of the construction work of the Addicks Dam embankment (fig. 5). A number of stone artifacts were collected from a scraped surface over a relatively restricted area on the west side of South Mayde Creek, immediately adjacent to the stream and between the present dam embankment and the borrow pit that parallels it on the inside of the dam. Inclusions of dark earth were visible in the embankment fill. However, no artifacts were found in them, and the question of whether they represent midden debris remains unanswered.

Projectile points, fragmentary blades, scrapers, and worked flakes comprise the artifacts found at this site. No potsherds were recovered, although unshaped lumps of burnt clay were noted. During the construction of the dam, earth-moving machines had cast up and demolished an unknown number of burials. No artifacts were noted at the time, however, and the area was presumed to have been an unrecorded Caucasian cemetery.

From the point where it is joined by Horsepen Creek, Langham Creek flows in a general southerly to southwesterly direction to its confluence with Bear Creek (fig. 5). Below this, it follows a meandering course, its general trend slightly east of south, until it debauches into South Mayde Creek which flows in from the west. Three sites are located along Langham Creek. Two of these, site 42/66A6–4 and the Kobs site (42/66A6–3), are upstream in the order named from the South Mayde Creek-Langham Creek junction but below the mouth of Bear Creek. The Grisbee site (42/66A3–1) is on Langham Creek just below the mouth of Horsepen Creek.

SITE 42/66A6–4

Site 42/66A6–4 is located on the south side of an east to west meander of Langham Creek, about 150 m. (492.12 feet) above its confluence with South Madye Creek (fig. 5). A troughlike depression lies between the midden and the stream some 10 m. (32.80 feet) to the north (fig. 11). It is parallel both to the stream and the long axis of the midden and probably represents the stream channel at the time the site was occupied. About 20 m. (65.61 feet) east of the midden at the point where the creek turns west from its more normal southerly course it is joined by an intermittent contributary from the northeast. Rather open woods of oak and large pine lie to the east and the stream course is lined by willow trees. The midden is 27 m. (88.58 feet) along its east-west axis, 15 m. (49.21 feet) across the north-south axis, and rises approximately 60 cm. (1.96 feet) above the flood plain. It is somewhat higher at the eastern end and slopes gently off to the south and west. There is an irregular, shallow depression in the southwest quadrant of the site where the former owner, Mr. Kobs, had buried a horse.

Two test pits were dug on this site. The first was 60 cm. (1.96 feet) by 1 m. (3.28 feet) in size and was excavated by 30 cm. (0.98 foot) levels to determine the nature and vertical extent of the deposit. A second pit, 1 m. (3.28 feet) square, was dug to check further the stratigraphy of the site. Arbitrary levels of 15 cm. (0.49 foot) thickness were taken out and the material segregated by level. The base of the midden deposit was reached at a depth of 85 cm. (2.78 feet) (fig. 12).

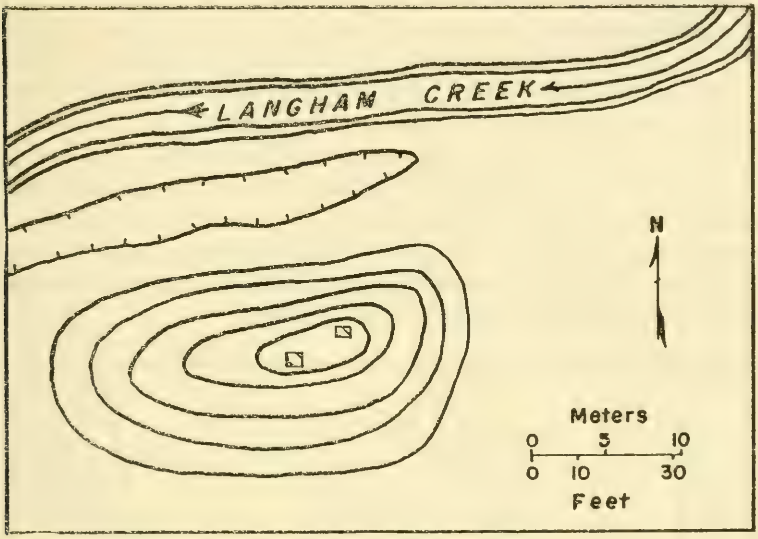

LANGHAM CREEK
N
Meters
0
5
10
0
10
30
Feet

Figure 11.—Sketch map, site 42/66A6-4, showing test pits.

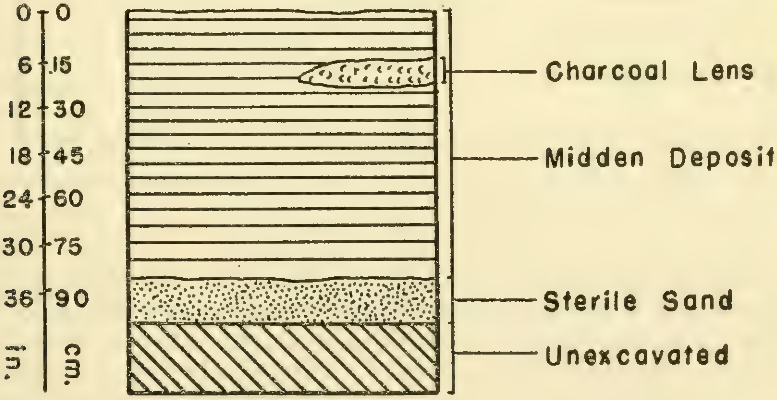

0 0
6 15
12 30
18 45
24 60
30 75
36 90
in.
cm.
Charcoal Lens
Midden Deposit
Sterile Sand
Unexcavated

Figure 12.—Stratigraphic section, site 42/66A6-4.

From the grass roots to a depth of about 30 cm. (0.98 foot) the midden soil was quite sandy and dark in color. A charcoal lens of hardwood burl 10 cm. (0.32 foot) thick and 40 by 50 cm. (1.31 by 1.64 feet) in area was encountered at a depth of 15 cm. (0.49 foot). From 30 to 60 cm. (0.98 to 1.96 feet) the midden contained less sand admixture and, although friable when dry, was somewhat more consolidated than the earth above it. Below 60 cm. (1.96 feet) the sandiness of the midden increased until a stratum of sandy clay was encountered. This layer was probably, at least in part, water-laid. Clean yellowish-white sand. devoid of cultural material but with pebbly inclusions of rusty clay, was reached at a total depth of 85 cm. (2.78 feet).

The site was comparatively poor in artifact yield. In the upper 45 cm. (1.47 feet) small projectile points of the types termed Perdiz Pointed Stem and Eddy Stemmed were found, and in addition, a few larger pieces. Below 45 cm. (1.47) feet) only large projectile points were found. Potsherds occurred throughout the deposit. One sherd from a flat-bottomed jar was found in this site.

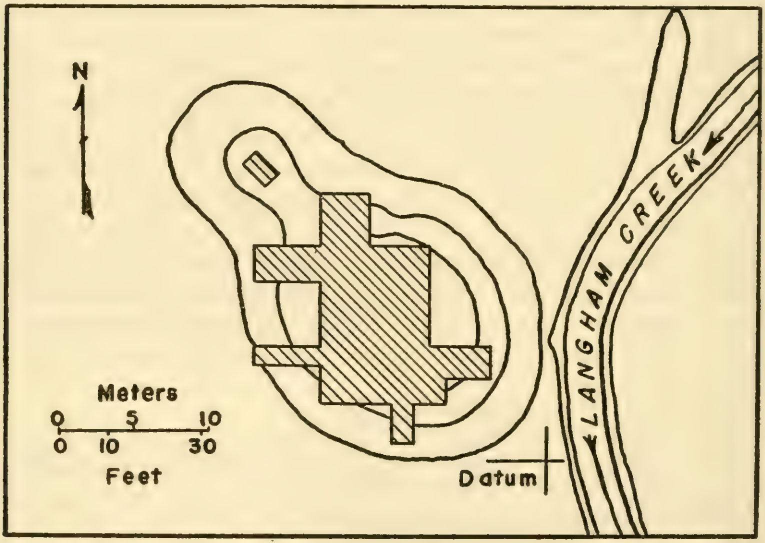


FIGURE 13.—Sketch map, Kobs site (42/66A6–3). Hatched area denotes area excavated.

THE KOBS SITE (42/66A6–3)

The Kobs site is located about 100 m. (328.08 feet) northeast of site 42/66A6–4 and on the opposite side of Langham Creek (fig. 5). In the vicinity of the site the creek flows southeast until it is joined by a southward flowing slough. Here it turns south past the eastern perimeter of the Kobs site and continues for some 90 m. (295.27 feet) to where it is joined by another slough and veers west past site 42/66A6–4 (fig. 13).

The site is a low, broad midden deposit rising 37 cm. (1.21 feet) above the flood plain (fig. 14). It is 18 m. (59.05 feet) across the shorter northeast-southwest axis and 24 m. (78.74 feet) across the

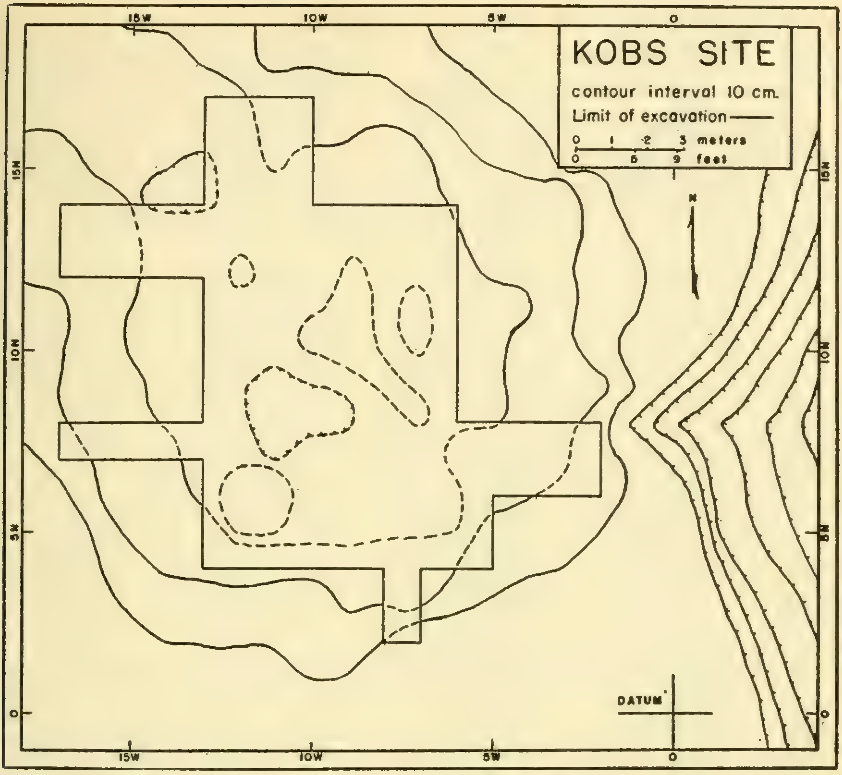


FIGURE 14.—Contour map and plan of excavation, Kobs site (42/66A6–3).

northwest–southeast axis. While the knoll upon which the midden rests is somewhat pear-shaped, the zone of occupation was more or less confined to the larger portion adjacent to the stream. The site is generally highest in the central portion and slopes very gently to the perimeter. There was a shallow depression some 2.50 m. (8.20 feet) in diameter in the southwest quadrant of the site, and immediately to the south was an isolated hummock of material probably derived from the depression. The highest point on the midden was on this hummock. The origin of this depression could not be precisely determined, but it may have been the result of the uprooting of a tree. A second possibility is that it represents previous digging by animals or by man. A second depression, about the same size as the first, lies along the northwest periphery of the site. The site itself was much overgrown by blackberry and other thorny vines and several trees, while the surrounding flood plain supported rather open woods of oak and pine. The stream channel is lined with willow trees.

A datum point was established at the base of a large oak tree to the southeast of the midden. A base line was established from the datum to another tree northeast of the midden, the magnetic compass orientation being 345°. As in the Doering site, a grid system of 1 m. (3.28 feet) squares was staked off, and excavation was by arbitrary levels of 15 cm. (0.49 foot). All the material was screened and the artifacts were segregated by square and level. Profiles established by using an architect's telescopic level and target rod were plotted on standard graph paper, and from this a contour map was prepared (fig. 14). Depth was measured from the surface level of the designator stake for each square.

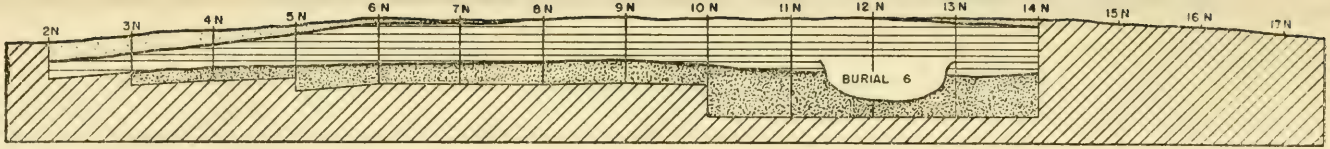
The uppermost stratum of the site consists of sandy midden soil, light tan in color, and varying in thickness from a few centimeters at the center of the site to some 30 cm. (0.98 foot) about the perimeter (fig. 15). While the color may reflect, in part, a weathering out of the organic stains common to human occupation, it is probable that occupation was not constant, and, furthermore, that some of the sand is the result of aggradation by natural agencies. Below the light-colored sandy layer is a stratum of dark, sandy midden deposit to a maximum depth of 75 cm. (2.46 feet). This deposit fans out toward the perimeter of the site. Since this stratum produced the largest number of artifacts and animal bones, it seems likely that this zone marks the period of densest occupation.

Conformably underlying the midden proper is a knoll of unknown depth composed of very light-colored, water-laid sand. As in the Doering site, the precise transition from the knoll to the overlying midden deposit is masked by the blending of the sand composing the knoll with the lower part of the midden. Although artifacts occur but infrequently in this stratum, they nevertheless indicate limited occupation of the site during a period when the knoll was still aggrading.

Artifacts from the Kobs site were most numerous in the dark midden zone. The majority of the projectile points in this stratum were Perdiz Pointed Stem, Alba Barbed, and Eddy and Scalhorn Stemmed. At the base of the midden deposit these were of about equal occurrence with Gary Stemmed points, indicating that the transition from the use of the large points to the smaller ones was already well under way. Pottery occurred frequently in this layer.

All the projectile points from the sand knoll are large, the majority being Gary Stemmed points. Pottery was quite rare in this stratum. In the upper part of the knoll several sherds of a Tchefuncte Stamped pottery jar were found, giving us one of our most important chronological clues and affording a tentative cross-dating with the early Tchefuncte cultures of the Lower Mississippi Valley.

Three burials were found in the Kobs site. Two of these were flexed, while the third was semiflexed. Two were buried in pits dug into the sand knoll, easily recognized because of the dark midden fill.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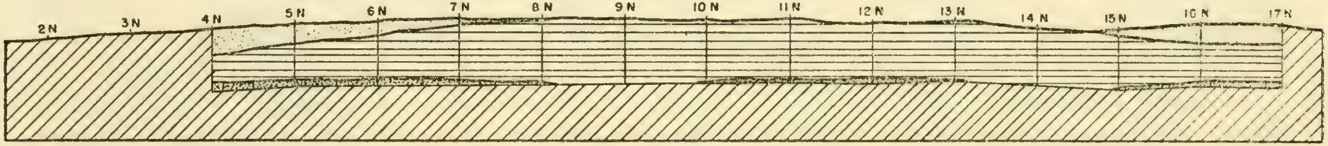
BURIAL 6

PROFILE AT 8 WEST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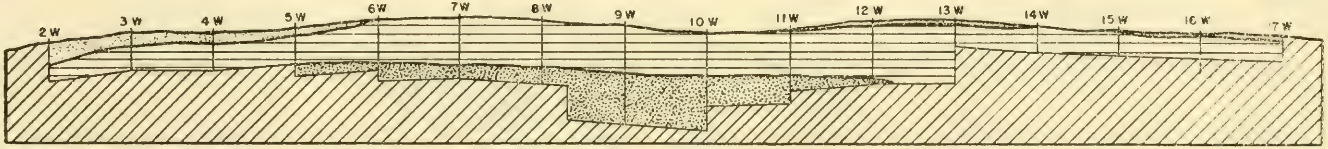
PROFILE AT 13 WEST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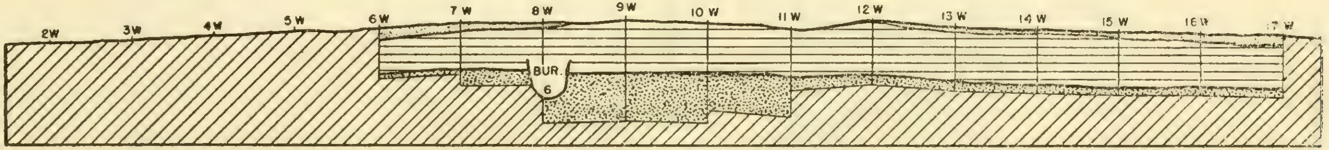
PROFILE AT 8 NORTH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BUR.
6

PROFILE AT 12 NORTH

Figure 15.—Profiles, Kobs site (42/66A6–3). Light stippling, weathered midden zone; horizontal hatching, midden deposit; dark stippling, sand knoll; diagonal hatching, unexcavated.

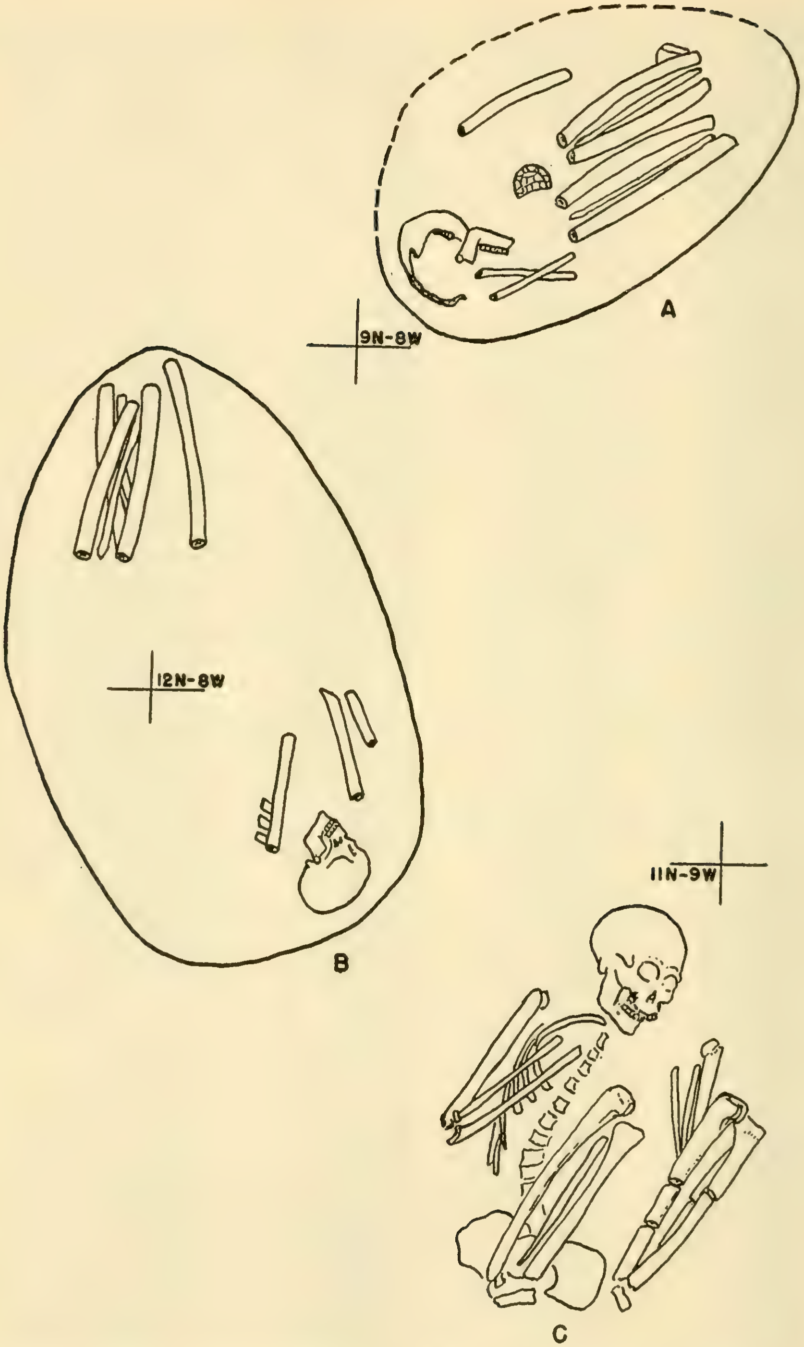
9N-8W
A
12N-8W
B
11N-9W
C

Figure 16.—Burials, Kobs site (42/66A6–3). *A*. Burial 5. *B*, Burial 6. *C*, Burial 7.

The third burial probably was also interred in a pit, but inasmuch as there was no penetration into the white sand of the knoll, none could be defined. Burial numbers were continued serially from those of the Doering site.

Burial No. 5 (fig. 16, *a*):

Location: 9N/7W.

Depth: 72 cm. (2.36 feet) to skull.

Matrix: Midden fill in oval pit 85 cm. (2.78 feet) long and of indeterminate width and depth. Pit well defined on south side by contrast of midden material with white sand of the knoll.

Position: Flexed on back; head oriented to southwest, facing southeast.

Arms: Right arm tightly folded against itself, hand to chin; left arm folded alongside chest, hand to left shoulder.

Legs: The legs were pulled close to and on top of body with lower legs rotated medially so that the feet crossed each other above the pelvis.

Age: Adult.

Sex: Female.

Associated Objects: Half of a small turtle shell with a few pebbles beneath it, found on top of the chest, may have been a rattle.

Remarks: Bone condition fair; some breakage due to ground pressure.

Burial No. 6 (fig. 16, *b*):

Location: 11N/7W–12N/7W–11N/8W–12N/8W, center of burial pit almost directly under designator stake for square 12N/8W.

Depth: 70 cm. (2.29 feet) to skull.

Matrix: Midden fill in elongated oval pit, 120 cm. (3.93 feet) long, 67 cm. (2.19 feet) wide, 40 cm. (1.31 feet) deep, excavated from midden into white sand of knoll.

Position: Semiflexed on right side; head oriented to southeast, facing northeast.

Arms: Upper right arm across chest to front of body, lower arm and hand missing; left arm folded alongside body, hand to left shoulder.

Legs: Upper legs form approximately a 140° angle with the body, the lower legs folded tightly against them.

Age: Adult.

Sex: Female.

Associated Objects: None.

Remarks: A number of bones were missing, including the left and right radii, left ulna, the lower vertebrae, pelvis, hand and foot bones, and most of the ribs. The leg bones were separated from the upper body by a distance much greater than normal. This, together with the number of missing bones, suggests the possibility that the body was partly decomposed before burial and that some attempt at rearticulation had been made.

Burial No. 7 (fig. 16, *c*):

Location: 10N/9W.

Depth: 40 cm. (1.31 feet) to skull.

Matrix: Midden fill.

Position: Flexed on left side, almost on its back; head oriented north-northeast, facing southeast.

Arms: Right arm folded along side, hand (missing) between right shoulder and chin; left arm tightly folded beneath the left leg, hand under left side of face.

Legs: Pulled close to chest, feet at pelvis.

Age: Adult.

Sex: Male.

Associated Objects: None.

Remarks: Best preserved skeleton from the site. No burial pit visible because of homogeneity of midden earth.

THE GRISBEE SITE (42/66A3-1)

The Grisbee site is located at the north end of a westward meander of Langham Creek about 150 m. (492.12 feet) south of its junction with Horsepen Creek (fig. 5). At the south end of the meander, potsherds, lithic artifacts, and other camp debris are eroding from a stratum about 10 cm. (0.32 foot) in thickness underlying an average 20 cm. (0.75 foot) of alluvial fill. The area encompassed by the meander supports a cover of small pine trees, many of them of second growth. Along the stream are oaks and other hardwood trees, as well as willows and a few larger pines. Approximately 20 m. (65.61 feet) above the site an intermittent contributary joins the main channel of Langham Creek from the northeast.

The site consists of a midden deposit 90 cm. (2.95 feet) thick overlying a kidney-shaped knoll which parallels the bend of the stream on the southeast bank as it turns into the westward meander (fig. 17).

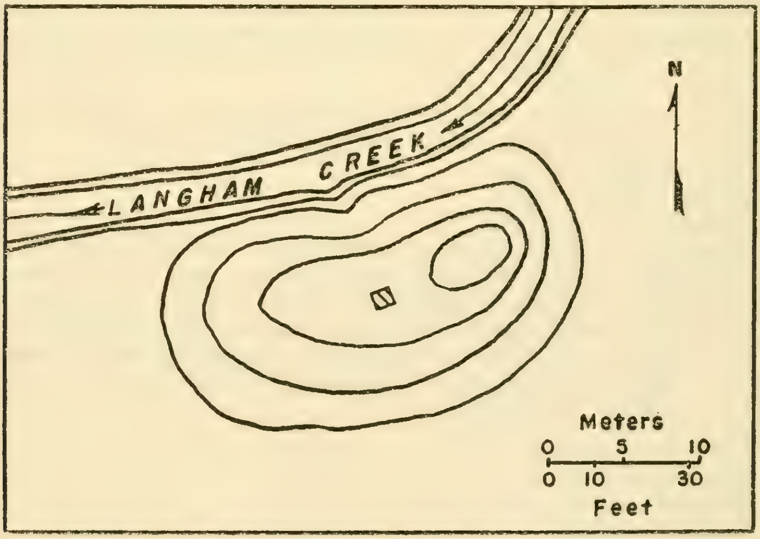

FIGURE 17.—Sketch map, Grisbee site (42/66A3-1), showing test pit.

The site is 15 m. (49.21 feet) across its northeast–southwest axis and 27 m. (88.58 feet) across its northwest–southeast axis. The northeastern end rises sharply to approximately 45 cm. (1.47 feet) above the flood plain and the midden slopes gently to the south and west. The site is undergoing some lateral erosion on the edge next to the creek in the form of a miniature gulley cutting headward into the central portion of the midden. The remainder of the surface is stabilized by an undergrowth of thorny vines and low bushes. Three large oak trees are growing on the lower slopes of the midden.

A stratigraphic test pit 1.20 m. (3.93 feet) square was excavated by 15 cm. (0.49 foot) arbitrary levels, approximately in the center of the midden (fig. 18). From the surface to a depth of 15 cm. (0.49 foot) was an indurated crust of topsoil and sparse midden deposit, compacted, perhaps, by the pressure of the hooves of grazing cattle (fig. 16, *b*). Below this crust the midden earth was cohesive.

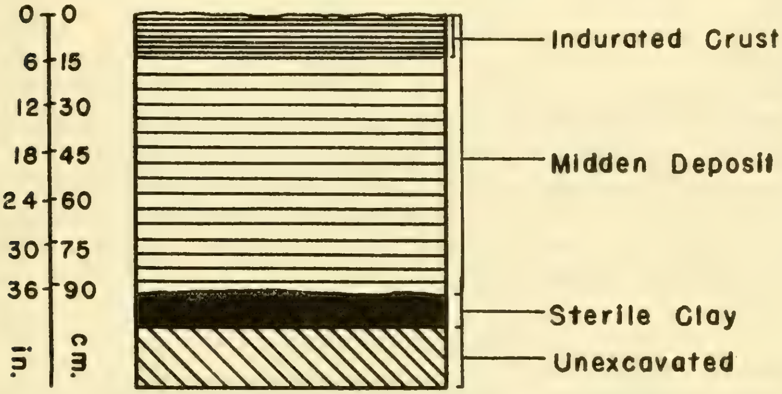

Figure 18.—Stratigraphic section, Grisbee site (42/66A3–1).

From 45 to 75 cm. (1.47 to 2.46 feet) the organic content of the deposit greatly increased, making it more friable and perceptibly darker in color. Most of the artifacts obtained at this site come from this level, which probably represents the period of heaviest occupation. Below this level the midden continued to a total depth of 90 cm. (2.95 feet) where it rested conformably upon the sterile clay composing the knoll.

The uppermost 60 cm. (1.96 feet) of the deposit contained Perdiz Pointed Stem and other upper level types, as well as a few Gary Stemmed projectile points. Below this level only the larger points were found. Potsherds occurred in all levels of the midden but were infrequent in level 75–90. One sherd from the base of a flat-bottomed vessel and two small rodlike pieces of pottery that may have been limbs of pottery figurines were unusual finds in this site.

MATERIAL CULTURE

Approximately 7,000 artifacts were recovered from the Addicks Basin sites, the great majority deriving from the Doering and Kobs middens, and most of the remainder from those sites surveyed and tested by the survey. The group of artifacts from the Addicks "Mound" (42/66A6–1) were donated to the Smithsonian Institution by Marshall Black of Houston.

Twenty-five artifacts were made of bone, antler, or shell by cutting, grinding, drilling, and polishing; 45 of granular stone by pecking or abrasion, tubular drilling, and polishing; and 1,870 of flint, chert, mineralized wood, chalcedony, and other crypto-crystalline, siliceous materials by percussion and pressure flaking. A few specimens of earthy minerals were, for the most part, of unaltered tabular or nodular form. The rest of the collection consists of about 5,000 potsherds and a few miscellaneous objects of clay.

POTTERY COMPLEX

The indigenous pottery of the region about the northern end of Galveston Bay consists of a single, highly variable ware divided into two subtypes, decoration serving as the primary criterion for the separation. These subtypes are tentatively named Goose Creek Plain and Goose Creek Incised (Campbell, n. d.). With the exception of a few sherds of intrusive wares, described below, all ceramic material falls into the above categories.

GOOSE CREEK PLAIN

Paste.

Method of Manufacture: Coiled. Sherds frequently break along coil junctions and often show oxidation between the coils where they were not sufficiently wedged before firing. Coils average 8 mm. (0.31 inch) in width.

Temper: Usually consists of sand of rounded quartz particles of variable size, although in some cases the sand is fine and of regular size. A few sherds, probably from two vessels, show calcium phosphate temper particles, and a number of sherds from the upper levels of the Kobs site appear to have clay or sherd temper. It seems probable that the calcium phosphate tempered sherds are from intrusive vessels.

Texture: Medium coarse to fine and compact, determined by the amount and size of the sand-temper particles. Some sherds seem to be almost pure sand, and the texture is like that of fine-grained sandstone. A few, however, are compact and fine-grained, the sand-temper particles firmly embedded in the clay. In cross section many of the sherds show coil laminae diagonal to the vertical axis of the vessel wall.

Hardness: Varies from 1.5 to 3.5 (Mohs' Scale), the average being about 2.5.

Color: Ranges from orange-red through reddish browns, brownish grays, and into very dark grays or black. Cores vary from reddish to black.

Ten sherds, selected at random and matched with the standard colors of Maerz and Paul,[2] show the following variations: 4A11, 5A11, 5E12, 6H11, 12C2, 14E6, 15A4, 15C8, 16A2, and 16A3. While this by no means exhausts the range of nuance of color, it shows the general variation. All the variations in color apparently are the result of uneven firing. A few sherds show remnants of a dark red wash or film applied on both interior and exterior.

Surface finish.

Usually smooth on both interior and exterior, with some variation of wall thickness resulting from uneven scraping and in some cases, perhaps, by finishing in the paddle-and-anvil technique. Marks produced by a denticulated instrument are occasionally visible on one or both surfaces. Exteriors sometimes have the surface scraped diagonally to the vertical axis of the vessel; and the interiors of a few sherds show vertical polishing marks on a dense black surface. Floating of fine particles of the paste to the surface was commonly used to produce a smooth finish. Such surfaces erode easily. Crackling of the surface occurs occasionally.

Form.

Wall Thickness: Range is 2 mm. to 10 mm. (0.08 to 0.39 inch); average, 6 mm. (0.23 inch).

Rim: Usually vertical, a few slightly outcurving. Thickness of the wall is ordinarily decreased toward the lip, usually from the vessel's interior, but occasionally from both interior and exterior (fig. 19).

Lip: Normally allowed to come to a relatively sharp edge (fig. 19, *a–e*), but sometimes flattened (fig. 19, *m–t*) or rounded (fig. 19, *f–l*). Lip notching is common, usually on the interior edge, but occasionally on the outer edge, and sometimes across the lip. Rim sherds from two vessels show notches formed by pinching with opposed thumb and fingernails creating a deeply scalloped effect. The lip of one rim sherd has been enlarged to form a lug (fig. 19, *v*, *w*).

Body: No whole vessels were found, but two shapes have been determined from partly reconstructed pieces. One of these is a deep bowl with full round sides incurving slightly at the rim (pl. 31, *d;* fig. 20, *d*). The second form is a small jar with slightly outcurving rim and sides that curve gently to a full round bottom (fig. 20, *a*).

Size: Forty-four rim sherds (including five partially restored vessels) have a range of diameters from 6 cm. (2.37 inches) to 44 cm. (17.50 inches). Twenty-four of these fall in the 20 to 30 cm. (7.81 to 11.80 inches) range, the remainder being distributed about equally. Depth may be defined only in the five partially restored vessels and varies from circa 15 to 25 cm. (5.90 to 9.68 inches).

Bases: Perhaps the most common base form is round; but pointed or conoidal forms are of frequent occurence (Fig. 21). Bases are usually thickened at the center and frequently form a distinct node. Two bases are round and flat, the transition from base to wall marked by a distinct angle, and another apparently flattened squarish in outline.

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[2] Maerz and Paul, 1930. The notation system refers to plate number, file, and rank, in the order given.

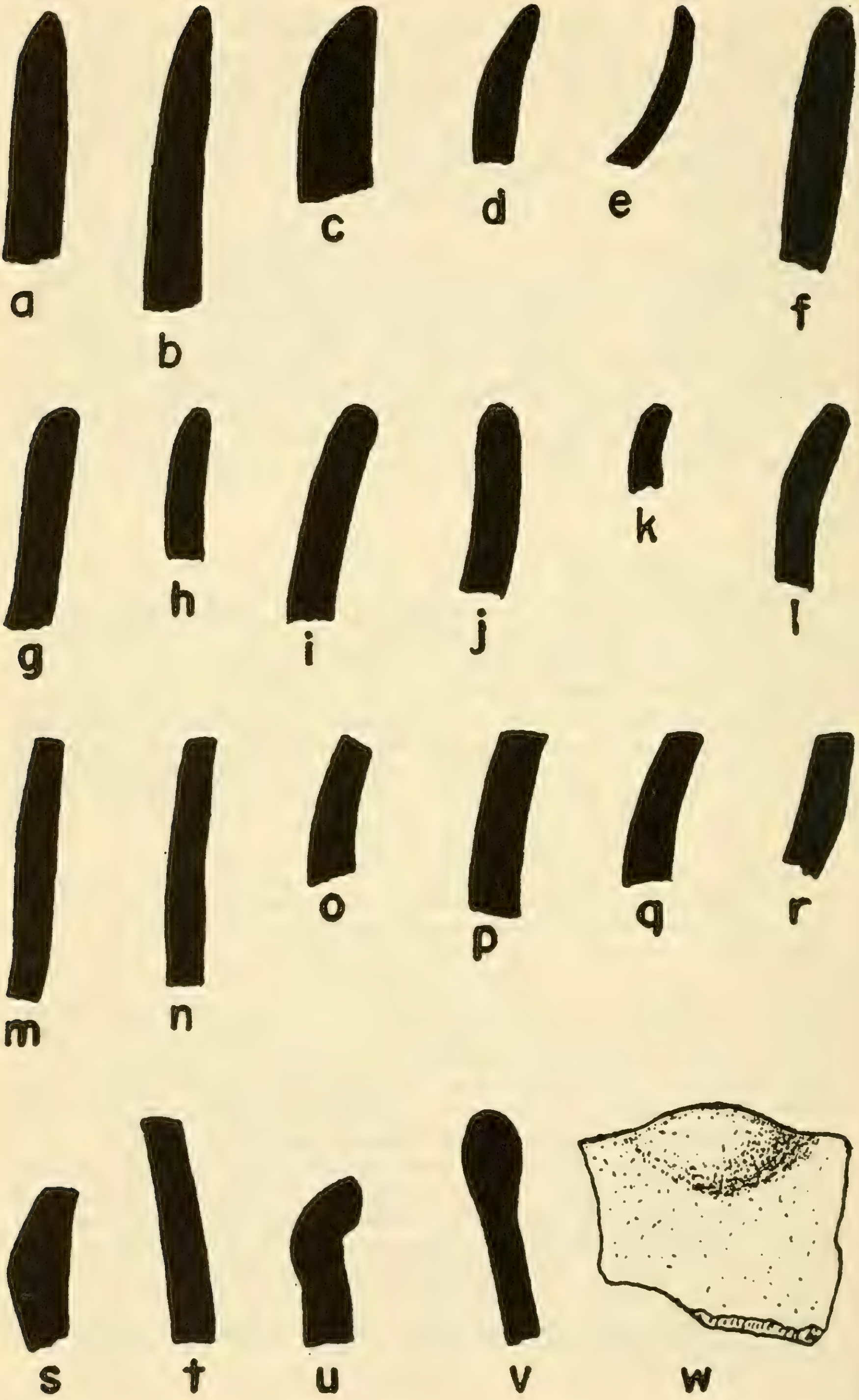
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Figure 19.—Pottery: Rim and lip profiles. *a-e*, Sharp edge. *f-l*, Rounded edge. *m-t*, Flattened edge. *u*, Sharp outcurve. *v, w*, Lug. Interiors to left.

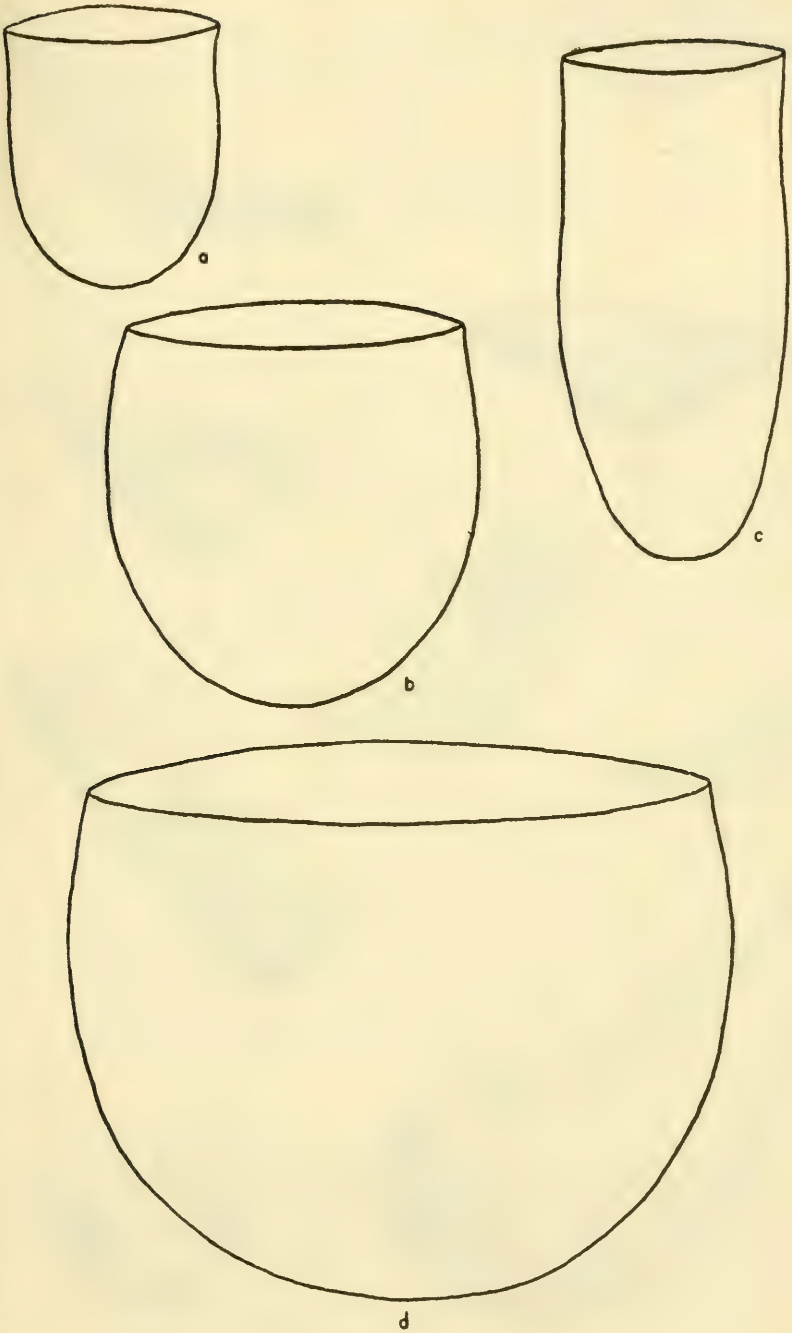

Figure 20.—Pottery: Vessel shapes.

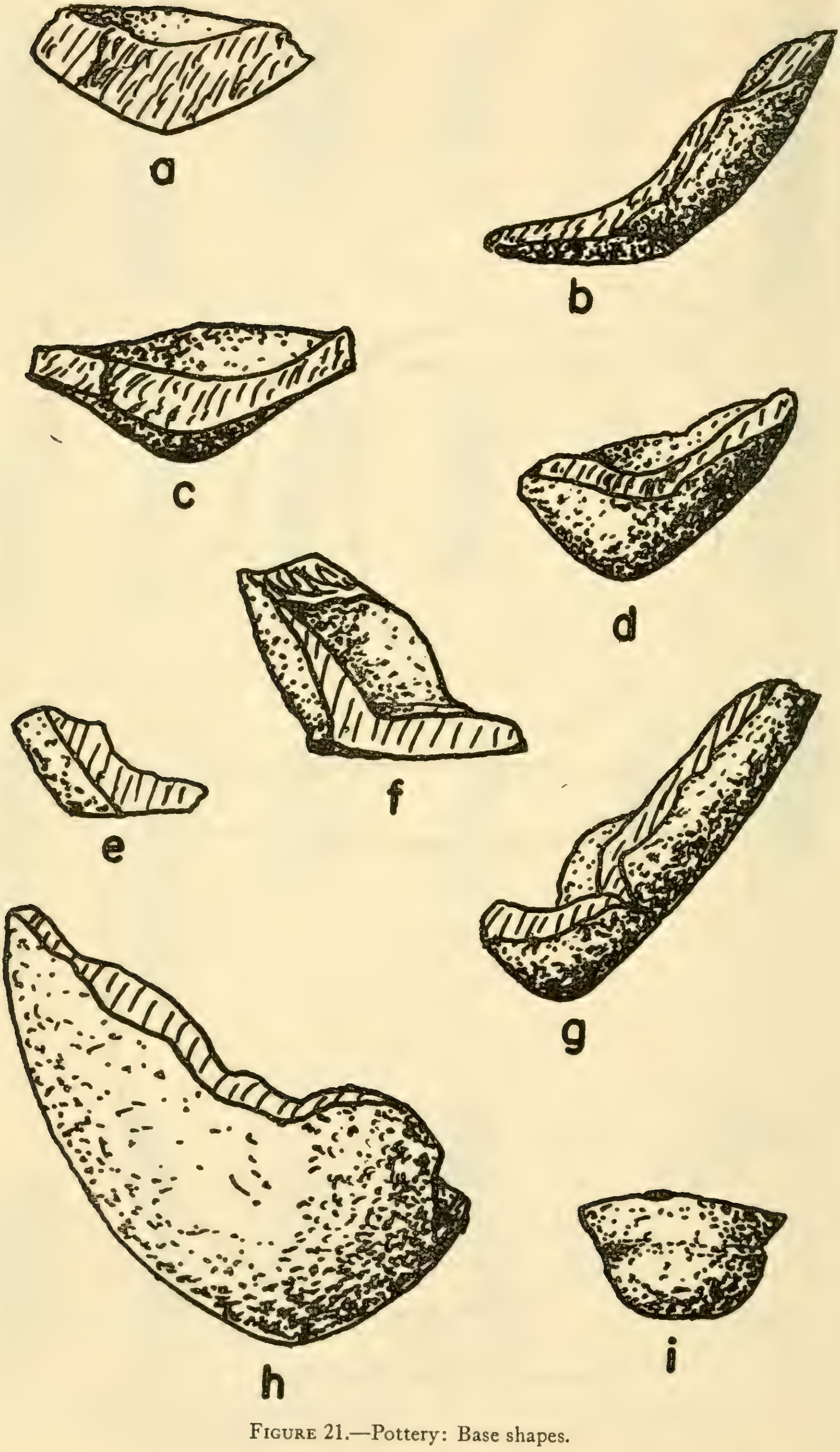

FIGURE 21.—Pottery: Base shapes.

Distribution.

Insufficient data are at hand to define the complete distribution of the type, but its present known range is a zone some 30 miles wide along the northern periphery of Galveston Bay and an unknown distance northeast and northwest.

GOOSE CREEK INCISED

Paste.

Paste features as described above for Goose Creek Plain.

Surface finish.

As described above.

Decoration.

The zone of decoration is confined to the rim section in all specimens recovered. Design elements are simple and are produced by incising the wet clay with a sharp implement. A few sherds combine incision with punctation, and sherds from a single vessel show punctation used alone as the decorative technique.

The most common form of design is single, dual, or, infrequently, multiple lines around the circumference of the vessel just below and parallel to the lip (pl. 32, *a–g*). These vary from fine, evenly incised lines to crude ones drawn with a rough tool. A variation of this style is the inclusion of a wavy or zig-zag line between parallel framing lines (pl. 32, *h*). These latter elements are sometimes pendant from a straight top line and occasionally appear singly or paired, independently of straight framing lines (pl. 32, *i–m*). The character of execution of these lines varies considerably.

Triangles, pendant from a straight line or alternating between double parallel lines, are frequently hatched and sometimes cross-hatched (pl. 33, *a–c*). Double concentric triangles occur infrequently (pl. 33, *d*, *e*). Ladderlike elements and parallel rows of punctation sometimes form triangles or other geometric figures (pl. 33, *g–i*). The ladderlike elements are formed by parallel incised lines which are connected by short, equidistant transverse lines at more or less regular intervals. Punctations are usually quite small, about 1 mm. (0.039 inch) wide and 1.5 mm. (0.059 inch) long, and are made with a small pointed tool. On one rim sherd, parallel paired rows of three punctuations each, made with a small hollow instrument (perhaps a cane section) pressed into the clay at an angle so as to produce a crescentic punctation, are pendant from the lowermost of three parallel incised straight lines (pl. 33, *j*).

Form.

Rim: As described above.

Lip: As described above.

Body: Two shapes have been distinguished for Goose Creek Incised from the partial restoration of three vessels. One form is represented by two deep, narrow jars with nearly vertical sides (pl. 31, *a*, *b;* fig. 20, *c*). The jar is slightly constricted below the rim, but the basic shape is semicylindrical. The bottom converges gently to a rounded or conoidal base. The second form is a wide-mouth jar which expands slightly from the mouth to an elongate, globular body and a full round base (pl. 31, *c;* fig. 20, *d*).

TCHEFUNCTE STAMPED

Five sherds have been identified as Tchefuncte Stamped (Ford and Quimby, 1945, pp. 56–57; pl. 30, *f*) ware (pl. 33, *k*).[3] These sherds, all part of the rim of a single vessel, vary somewhat from the usual Tchefuncte type in their relative thinness, the deepness of the lip notching, and in that the temper is sand. It should be stated that sand and grit tempering was not unknown, either in the Tchefuncte period or in Tchefuncte Stamped ware itself. The rim is slightly flaring and the lip is roughly notched on the outside. Below the rim and parallel to it is a row of rocker-stamped impressions produced by a forked implement, the lower part being more heavily impressed than the upper. Pendant from this are parallel vertical rows of rocker-stamped impressions. These rows measure 7 mm. (0.28 inch) wide, and the distance between rows varies from 5 to 10 mm. (0.20 to 0.39 inch). A single crack-lacing hole, drilled from the outside, is 25 mm. (0.96 inch) below the lip.

UNIDENTIFIED WARES

Fifteen sherds from the wall of a single vessel have not been identified as to type (pl. 33, *l*, *m*). The entire exterior surface is decorated by lines formed with a denticulated implement and arranged in rows parallel to the rim of the vessel, then crossed by both vertical and diagonal rows of parallel lines.

A single sherd has asphalt adhering to it and may be intrusive from the Rockport Focus (Sayles, 1935, pp. 35–40, table 5).

MISCELLANEOUS OBJECTS OF CLAY

Clay Rods.—Four small, round pieces of pottery range from 7 to 9 mm. (0.28 to 0.36 inch) in diameter. Length cannot be determined accurately since all specimens are fragmentary. Two are broken at both ends, one terminates in a rounding point, and the other has a tapering point. They do not appear to have been handles or lugs for pots, and it is difficult to imagine a utilitarian function for them. Although no identifiable figurines were found, these objects may be limbs from broken specimens. These are from levels 30–45 and 45–60 in the Grisbee site, and levels 30–60 and 60–75 in the Kobs site.

Two somewhat flattened rods of clay are twisted across each other and are pressed together to form a single object. It is from level 30–45 in the Kobs site.

Worked Sherd.—A single sherd, roughly rectangular in outline, has a small projection on one end, formed by notches ground in from the sides. This may have served as a pendant.

CERAMIC STRATIGRAPHY

Because the apparent paucity of sherd material in the lower levels of the Doering and Kobs middens implied the possibility of a nonceramic horizon, stratitests were made to determine the validity of such an hypothesis. Five contiguous meter squares, each penetrating to sterile native soil beneath the midden, were chosen at both the Kobs and Doering sites to serve as check squares. Test pit 2 at site 42/66A6–4, and test pit 1 at the Grisbee site, while not equivalent in cubature, are included to show comparative data from other sites.[4]

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[3] George I. Quimby has examined these sherds and confirmed the identification. Dr. James B. Griffin does not fully concur in this identification. However, basically the sherds so closely resemble Tchefuncte Stamped, and inasmuch as there is no other known type to which they can be assigned, I have retained the original allocation.

Table 1 shows the sherd count from the stratitest squares by level from each of the sites.

TABLE 1.—*Sherd count from stratitest squares at Doering, Kobs, 42/66A6–4, and Grisbee sites*

Level	Sites							
	Doering		Kobs		42/66A6–4		Grisbee	
	[1] P	[2] I	[1] P	[2] I	[1] P	[2] I	[1] P	[2] I
0–15	7		19		6		3	
15–30	15		61		11		11	
30–45	20	2	70	4	8		49	
45–60	12		59	2	18		106	1
60–75	1		32		7		14	1
75–90	1		23		1		2	1
90–105	3		12					
105–120	1		6					

[1] P = Goose Creek Plain.
[2] I = Goose Creek Incised.

Analysis of the data in table 1 indicates that in the Kobs and Grisbee sites and in site 42/66A6–4 pottery increased rather uniformly in frequency from the lowest level, reached a maximum, and then declined before the abandonment of the site. This is not true of the Doering site. While the sherd count of the stratitest squares for the Kobs, 42/66A6–4, and Grisbee sites appears to reflect closely the usually observed conditions occurring elsewhere in the sites, the count of the Doering site requires clarification.

A single sherd from the stratitest occurred in level 105–120. There was a total of five sherds from level 90–105, including three from the stratitest; and from level 75–90 there were three sherds, including one from the stratitest. This makes a total of nine sherds found below level 60–75. The stratitest count for level 60–75 presents a discrepancy, inasmuch as only one sherd was found in the stratitest, while the uncontrolled count for the level is 48, making a total of 49 sherds. Above 60–75 the stratitest count shows a uniform frequency increase to level 30–45, and above that, a decrease. This appears to be representative of the conditions throughout the rest of the site.

The stratitest sherd count indicates that Goose Creek Incised is both scarce and limited in its distribution to the upper levels. The vertical distribution of the incised ware, however, is not confined to the levels indicated by the stratitests but has, instead, a continuous distribution upward from level 75–90, depending upon the interpretation given the occurrence of sherds below 60–75, at the Doering site.

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[4] Stratitest squares for the various sites are as follows: Doering: 18N/1E, 18N/2E, 18N/3E, 18N/4E, and 18N/5E. Kobs: 9N/10W, 10N/10W, 11N/10W, 11N/9W, and 11N/8W. 42/66A6–4: Test pit 2. Grisbee site: Test pit 1.

The actual percentage of incised to plain ware cannot be assessed accurately since decoration is confined to the rim and upper part of the body, and basal and lower body sherds may have come from either plain or incised ware. However, judging from rim sherds, the plain ware clearly predominated.

Although sharp lipped profiles predominate numerically over both flattened and rounded forms at all levels, there is no indication that they are appreciably older (table 2). There are too few rim sherds at the lower levels to supply satisfactory chronologic criteria.

Table 2 shows the vertical distribution of the various rim profiles.

TABLE 2.—*Frequency distribution by site and level of rim profiles*

Level	Profiles								
	Sharp lip			Flat lip			Round lip		
	[1] D	[2] K	Total	[1] D	[2] K	Total	[1] D	[2] K	Total
0–15	6	25	31	4	22	26	3	14	17
15–30	10	31	41	9	21	30	14	15	29
30–45	6	25	31	6	18	24	5	10	15
45–60	8	24	32	5	10	15	2	10	12
60–75	4	21	25	1	12	13	1	9	10
75–90	1	3	4		1	1	1		1
90–105		4	4						
105–120									
Total	35	133	168	26	59	85	26	58	84

[1] D=Doering site.
[2] K=Kobs site.

DISCUSSION

As previously mentioned, a total of nine sherds was recovered from below level 60–75 in the Doering site. With level 60–75 appears a sudden definite increase in frequency of pottery, an increase which continues until a maximum is reached, and then a decrease, probably due to decreasing usage of the site.

This situation may be explained in several ways: One, that pottery was introduced early in the occupancy of the site but, for some reason, did not become popular for a considerable period of time. Two, that while the occupants of the lower levels of the Doering site were in contact with pottery-making peoples from whom they received occasional pieces in trade, they made none themselves before middle-level times. (Since the sherds from the lower levels are indistinguishable from middle- and upper-level material and form a typological series, this explanation does not seem probable.) Three, that pottery was not introduced until level 60–75 and that the nine sherds found below this level represent material displaced downward by rodent disturbance or the disturbance incident to dwelling on the site. The possibility of dual occupancy of the site may be ruled out since there is no break in the stratigraphy, and the lithic complex forms a continuum. On the whole, the third possibility seems the most likely explanation to the writer. Further support is vouchsafed this interpretation by an examination of the other materials from the lower levels. Leaving aside any typological considerations, the bulk of the lithic complexes, together with the bone and antler materials, effectively demonstrate this.

An extraction of data from tables 3, 4, 6, and 7 (below) yields the following results in comparison with the total number of sherds from the lower levels:

	Miscellaneous artifacts	*Sherds*
Level 60–75	149	49
Level 75–90	110	3
Level 90–105	84	5
Level 105–120	7	1

Thus, the clear predominance of bone, antler, and lithic materials tends to bear out the essentially nonceramic character of the lower levels.

By way of contrast, in the earliest levels of the remaining sites, pottery is already strongly represented in comparison with the lithic complex. Further, the increase in frequency of sherds from the lower levels upward to the maximum seems correlated with the increasing frequency of occupation of the sites as attested by a similar increase in the bone, antler, shell, and lithic remains. Taken together, these data show that pottery was already an important component of the total culture complex when occupation of the Kobs and Grisbee sites and site 42/66A6–4 began. Upon this basis the lower stratigraphic levels of these sites would correlate with the middle stratigraphic levels of the Doering site.

Chronologically, two factors are of importance. The first of these is the presence of Tchefuncte Stamped ware, intrusive into the pottery complex of the lower level of the Kobs site. This intrusion would seem to fix a relative point in time for the occupation of the Kobs site. Since it is found in an assemblage in which pottery is already significant, it is probable that the intrusion occurred comparatively late in the Tchefuncte period. If one accepts the A. D. 500–900 dating assigned the Tchefuncte by Martin, Quimby, and Collier (1947, p. 401), a date nearer the A. D. 900 terminus would seem most likely for the earliest deposits at the Kobs site. Recently, radiocarbon dates have been published for the Tchefuncte Culture (Arnold and Libby, 1951).

These dates, A. D. 1317 ± 150, and 717 ± 250 are confusing. The earlier date falls near the middle range originally postulated, but the later one is much too late to be accepted at face value. In terms of dates for other southeastern cultures of a similar technological stage of advancement both seem too late. On the whole, it would seem best to withhold acceptance of either of the radiocarbon dates until further information is forthcoming.

The second important factor is the apparent introduction of pottery to the established lithic complex of the lower levels of the Doering site, an event usually held to delimit the Archaic from the later Southeastern horizons (Sears, 1948, pp. 122–124). Considering the data from the Kobs site as our most secure chronological tie for the middle and early levels, it seems not unlikely that the lower, nonceramic levels of the Doering site antedate those of the Kobs site by perhaps several centuries.

Of possible chronological interest, although of minor importance, is the stratigraphically late appearance of new aplastics, calcium phosphate, and perhaps sherd temper. However, sand temper continues to predominate here as in the lower levels of all sites examined. It is this essential uniformity of Goose Creek wares throughout both their vertical and areal distribution that renders them, per se, of little value as time markers.

Briefly, the most salient structural features of the Goose Creek wares are: Sand-tempered paste; vessels made by the coiling technique and usually thinned by scraping; surface normally smoothed by floating the smaller particles to the surface to form a mechanical slip, but occasional other treatments; few and simple shapes, the most characteristic being elongated globular jars with slightly constricted necks and wide mouths, and large, deep, wide-mouthed bowls of simple contour; bases are round, truncated conoidal, or conoidal, and frequently terminate in a distinct node; rims are simple and direct, for the most part, and have rounded, flattened, or relatively sharp-edged lips, in order of their increasing importance.

As a preliminary statement, it may be noted that these traits stand in sharp contrast to the Mississippi culture pottery complex (Deuel, 1935, pp. 437 et seq.). The pottery complex of the Addicks Basin belongs to the predominantly smooth or plain surface tradition of the Southeast.[5] This tradition, developing out of the various fiber-tempered plain types, consists of a series of clay and sand-tempered wares, Tchefuncte Plain, Mandeville Plain, St. Johns, and Weeden Island Plain, and their associated incised and stamped wares,[5] to which may now be added the Goose Creek wares.

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[5] Griffin, 1949, personal communication.

The specific resemblance of the elongate globular jar with conoidal base to jars of the Northern Woodland groups (Anonymous, 1943, p. 396) raises an interesting problem. The shape is not common in the Southeast, occurring only in Florida (Moore, 1902, pp. 159, 300; figs. 52, 270). However, the surface treatment of all pottery recovered from the Addicks Basin sites is typically Southeastern, and only the shape of these jars is reminiscent of the Woodland vessels. Paddle stamping, the prevalent surface treatment of Woodland pottery, was not found. The question of the ultimate derivation of this shape is one for a specialist and lies beyond the limits of this paper.

The decoration of Goose Creek Incised is confined to the rim and upper wall of the vessel. Lip notching, incising, and punctation are used singly or in combination to form simple geometric designs. These decorative techniques are typically Southeastern, although they also occur elsewhere.

Specific relationships at the early levels seem to be confined to the Tchefuncte Culture of the Lower Mississippi Valley. From the middle levels of the Doering site a single sherd which has a thick, flattened globule of bitumen or asphalt adhering to the surface may be intrusive from the Rockport Focus (Sayles, 1935, pp. 35–40; table 5) which centers along the Gulf Coast south and west of the Addicks Dam Basin.[6] It is possible, however, that the asphaltum is accidental, since it was used to a considerable extent in the hafting of projectile points. On the late horizon an unidentified trade ware, characterized by an all-over design produced by a dentate instrument, and a more compact paste, is represented by sherds from a single vessel. It cannot be related to a known source. Also late in the occupancy of the Addicks sites calcium phosphate and perhaps sherd temper make an appearance, but whether these aplastics were used locally in the manufacture of pottery or represent trade relationships is not yet determined.

Pearce (1932 a, p. 51) records much use of slips and paints on the pottery of the Galveston Bay region. This was not confirmed by our excavations. Floating of the surface to produce a mechanical slip is characteristic, but there was no evidence of a true slip. Paint appears to be confined to a wash or film of red occasionally present on both interior and exterior of vessels. This trait may be related to the red filming technique of the Tchefuncte Culture, although the tempering and thickness differ somewhat (Griffin, 1949, personal communication).

Gatschet (1891, pp. 24, 69) records the presence of pottery for the Karankawa Indians but leaves no description, so we cannot examine the possible affiliations of the ware with the Goose Creek wares. Archeologically, sites presumed to be Karankawan have been investigated by Sayles (1935, pp. 35–40), Martin (1929, pp. 50–57; 1931, pp. 53–56), and Potter (1930, pp. 41–44). While asphalt, used both as a paint in decoration and for producing a waterproof coating on the interior of vessels, may be considered the hallmark of Karankawa pottery, Martin (1929, p. 56) distinguishes one type which differs in paste and treatment. The paste is described as being harder and less porous, and seldom shows the use of asphalt. The aplastic is not identified, however, and it is impossible to determine the likelihood of linkages with the Goose Creek wares. Both lip notching and incising occur, as well as asphalt painting. Potter (1930, p. 42), however, states that nearly all decorated vessels are very thin-walled (2–4 mm. (0.08–0.16 inch)) and are reinforced or waterproofed by an interior coating of asphalt. Furthermore, the lip notching is preponderantly deep notching or grooving completely across the lip of the vessel, in contrast to the typical shallow interior or exterior notching characteristic of the Goose Creek ware (Potter, 1930, p. 43, pl. 7, Nos. 5–10). Jar and bottle shapes occur in the Karankawa series but are significantly different. The small, deep, simple-contoured, wide-mouth bowl, while much smaller in the asphalt painted group, is a logical counterpart, in shape, to the larger bowl forms in the Goose Creek series (Potter, 1930, p. 44, pl. 8, No. 15). Thus, while there are significant differences, there are, nevertheless, some similarities of shape and decorative technique which suggest possible interchange of certain traits, at least during the late period from which all the reconstructed vessels from the Addicks Basin have come.

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[6] Rockport Phase of Sayles.

The Attakapan Phase suggested by Sayles (1935, p. 41) is characterized by sand-tempered pottery decorated with incised lines, nondistinctive lithic complex, and usually the presence of European trade goods. Since no details are given, it is not possible to correlate this phase with the sites excavated in the Addicks Basin. Further, none of the Addicks Basin sites produced any evidence of historic contact. However, as defined by Sayles, this phase may represent the historic focus of the culture of the peoples of the Addicks Basin area. On the whole, the general paucity of extra-areal contacts points to the relative isolation of the Addicks Basin peoples.

LITHIC COMPLEX

If cultures predominantly lithic in complexion are to be correlated satisfactorily with each other and with groups whose history is largely told in ceramic terms, then we must pay the same attention to artifacts of stone, bone, shell, etc., that has yielded such valuable results in the study of pottery. We must arrive at an intelligent classification based not upon one or two features, such as outline or flaking technique, but upon the totality of inherent traits that make one group of artifacts distinct from another. The range of variation within the type must be realized, and distribution in space and time recognized and plotted. It is incumbent that the word description of nonpottery artifacts be as clear and accurate as possible and be fully documented by photographs and drawings. When we have accumulated such a corpus of data we shall be in a position better to define and understand the relations of groups of people who, while differing in their economic adaptations, are alike in leaving a heritage limited to imperishable bits of stone and pottery.

In this paper projectile points have been classified according to the Typological Concept as defined by Krieger (1944, p. 271–288). The binominal system of nomenclature for projectile points in use by the Texas Council of Archeologists, and recently adopted by the Southwestern Archeological Conference, Point of Pines, Ariz., has been used in this report. This system, long used in pottery designation, combines the type-site name and a word or phrase descriptive of the most characteristic or consistent feature of the projectile point.

As previously stated, named projectile point types are those which, for the most part, have been established by Kelley, Krieger, or Campbell, of the University of Texas, and the present specimens have in each case been checked by them.[7] One new type, Kobs Triangular, has been established on the data furnished by the Addicks Dam Basin excavations. The remaining named types have been designated by several different investigators and will be discussed under the proper headings below.

A number of provisional types have been set up. These have been numbered rather than named, inasmuch as our data are altogether too scanty to establish them on a firmer foundation. They may be considered as "working groups" in the sense that this term is used by Krieger (1944, p. 280, fig. 25). It is entirely probable that some of them may be consolidated into more inclusive types. It is equally possible that fuller information may require further subdivision. In any event, it has been thought best to describe them in detail and to place them on record as a basis for future work in this and neighboring areas.

For conciseness in description, data are presented in expanded outline form, and certain descriptive conventions have been adopted. Points whose width equals or exceeds their length are considered to be of broad proportions. Long or narrow proportioned points are those in which length is as much as, or more than, twice the width. Points whose length-breadth relations are intermediate are designated as of medium proportions. "Contracting stem" is used to describe tangs which increase in width from the base to the point of intersection with the blade; "expanding stem" implies the reverse condition. A "Remarks" section has been included to cover such data as deviations from norm and temporal and areal range. No attempt has been made to exhaust the literature concerning distribution, since the varying treatments and the gaps in areal coverage make such distribution studies hazardous at present. Distribution, where given, is simply to point out certain basic similarities of form, technique, and size of typologically similar artifacts in other areas in an attempt to generalize upon areas of possible influence.

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[7] Although references to the names of several of these types have previously appeared in print, the present paper constitutes their first description at length. However, type descriptions based on greater areal sampling are to be published by the responsible individuals cited above.

The stratigraphic sequence of projectile points in the Addicks Dam Basin sites is of particular significance, since it provides a relative chronological framework by which the different sites may be temporally equated. This is the more important since pottery, usually the most sensitive criterion, did not here reveal significant variations in style or structure which might serve to distinguish the wares of one period from those of a later date.

Projectile points may be divided into two major groups: the generally smaller and lighter arrow points whose occurrence is confined to the upper levels of all the middens tested; and the larger, heavier dart points found chiefly in the middle and lower levels. Certain types, represented only in the stream-bed collection, cannot be placed precisely in the relative chronology and have, therefore, been grouped separately until further excavation shall reveal their correct placement.

The following tabulation shows the breakdown of the lithic complex into its component categories:

Artifacts of stone:		
Chipped stone:		
Projectile points:		
Upper Level types:		
Perdiz Pointed Stem	113	
Scalhorn Stemmed	12	
Eddy Stemmed	17	
Alba Barbed	34	
Kobs Triangular	34	
Provisional Type 1	4	
Provisional Type 2	3	
Provisional Type 3	1	
Provisional Type 4	1	
Total Upper Level types		219

Artifacts of stone—Continued
Chipped stone—Continued
Projectile points—Continued

Middle and Lower Level types:		
Gary Stemmed	518	
Provisional Type 5	2	
Wells Contracting Stem	1	
Provisional Type 6	25	
Provisional Type 7	23	
Provisional Type 8	13	
Provisional Type 9	8	
Provisional Type 10	9	
Provisional Type 11	22	
Provisional Type 12	28	
Provisional Type 13	6	
Provisional Type 14	8	
Provisional Type 15	1	
Provisional Type 16	2	
Provisional Type 17	5	
Provisional Type 18	15	
Provisional Type 19	18	
Provisional Type 20	6	
Pedernales Indented Base	2	
Provisional Type 21	2	
Provisional Type 22	12	
Provisional Type 23	21	
Provisional Type 24	3	
Clovis Fluted (?)	1	
Total Middle and Lower Level types		751
Unplaced types:		
Provisional Type 25	1	
Provisional Type 26	1	
Provisional Type 27	2	
Provisional Type 28	1	
Provisional Type 29	4	
Provisional Type 30	6	
Provisional Type 31	1	
Provisional Type 32	1	
Copena Point (?)	1	
Plainview Point	1	
Baird Beveled Point	2	
Nontypable fragments	284	
Total Unplaced types		305
Total projectile points		1, 275

Artifacts of stone—Continued			
Chipped stone—Continued			
Implements:			
Knives:			
Type 1a	2		
Type 1b	1		
Type 1c	1		
Type 1d	8		
Type 2	100		
Type 3	53		
Type 4	13		
Type 5	6		
Type 6a	1		
Type 6b	1		
Total knives		186	
Scrapers:			
End Scrapers, Stemmed	5		
End Scrapers, Large	3		
End Scrapers, Small	7		
Side Scrapers, Large	5		
Side Scrapers, Small	20		
Flake Scrapers	260		
Total scrapers		300	
Choppers:			
One end unmodified	20		
Both ends modified	54		
Chipped Celt	1		
Total choppers		75	
Drills:			
Type 1a	5		
Type 1b	4		
Type 1c	4		
Type 2a	3		
Type 2b	3		
Type 3	1		
Total drills	20		
Gravers	13		
Eccentric flint	1		
		34	
Total implements		595	
Total chipped stone			1, 870

Artifacts of stone—Continued		
Ground stone:		
Atlatl weights (banner stones)	2	
Sandstone abraders or saws	41	
Milling stone	1	
Handstone	1	
Total ground stone artifacts		45
Miscellaneous stone:		
Paint pigments		18
Total artifacts of stone		1, 933

PROJECTILE POINTS

UPPER LEVEL TYPES

Perdiz Pointed Stem (pl. 34, a–n); 113 Specimens.

Proportions: Usually medium but sometimes long and slender.

Blade: Edges normally straight, occasionally convex or concave, frequently serrated.

Shoulders: Prominent to barbed.

Stem: Most frequently long relative to total length of point, and contracting to a pointed or slightly rounding base.

Average dimensions: Length, 33 mm. (1.31 inches) ; width, 19 mm. (0.75 inch) ; thickness, 4 mm. (0.15 inch).

Provenience: See table 3.

Remarks: This type of point is the most characteristic of the upper levels in all sites tested and excavated. They are small, light in weight, and since they are commonly made from a thin flake, one side often shows most of the flaking. Workmanship varies considerably, but they are usually well made. The Perdiz Pointed Stem is one of the type projectiles for the Toyah Focus (Kelley, 1947 a, p. 122) which Kelley dates at circa A. D. 1500. It is a component of the lithic complex of the Frankston Focus of northeast Texas which Krieger dates between 1400 and 1600,[9] when it is replaced by Cuney Stemmed, a type not occurring in the Addicks Dam Basin sites. The Perdiz Pointed Stem type has a wide distribution over most of Texas, occurring from Trans-Pecos in the southwestern part of the state, across a broad central belt to northeastern Texas. These finds represent a southeastern extension of their known distribution.

Scalhorn Stemmed (pl. 34, *o–s*); 12 specimens.

Proportions: Long and narrow.

Blade: Edges straight and frequently serrated.

Shoulders: Straight to barbed, but usually obscured because of wide base.

Stem: Expanding to flaring, formed by diagonal notches from basal corner or just above; base straight to convex.

Average dimensions: Length, 36 mm. (1.43 inches) ; width, 17 mm. (0.68 inch) ; thickness, 3 mm. (0.12 inch).

Provenience: See table 3.

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[9] Krieger, personal conference.

Remarks: Appear stratigraphically later than Perdiz Pointed Stem, both here and in the type area. Distribution limited to central and eastern Texas, centering around Tyler.[10]

TABLE 3.—*Provenience of Upper Level types of projectile points* [1]

Type	Site	Level 0–15	15–30	30–45	45–60	60–75	Unlocated	Total
Perdiz Pointed Stem	D	8	5	1	1	1	[2] 4	20
	K	32	38	9	6	1	1	87
	4	2	1	1				4
	G				2			2
Scalhorn Stemmed	D	2					[2] 2	4
	K	1		3	2			6
	G		1	1				2
Eddy Stemmed	D	1						1
	K	4	9	1	2			16
Alba Barbed	D		2				[2] 3	5
	K	4	10	3	8	1		26
	G	1		1	1			3
Kobs Triangular	D		1				[2] 3	4
	K	6	6	10	4	2		28
	G				2			2
Type P-1	D	1	1				[2] 1	3
	K				1			1
Type P-2	K		1		1	1		3
Type P-3	K			1				1
Type P-4	K			1				1

[1] Symbols: D=Doering; K=Kobs; 4=42/66A6-4; G=Grisbee.
[2] =From stream bed collection; type P=Provisional type.

Eddy Stemmed (pl. 34, *t–x*); 17 specimens.

Proportions: Broad to medium.

Blade: Edges straight, occasionally serrated.

Shoulders: Barbed but obscured by flaring base.

Stem: Expanding to flaring, formed by diagonal notches from basal corner, as in the Scalhorn Stemmed; base straight to convex.

Average dimensions: Length, 23 mm. (0.90 inch); width, 17 mm. (0.68 inch); thickness, 3 mm. (0.12 inch).

Provenience: See table 3.

Remarks: Chronological and distributional data as for Schalhorn Stemmed.[11]

Alba Barbed (pl. 35, *a–h*); 34 specimens.

Proportions: Medium to long.

Blade: Usually concave from barbs to midblade, convex to tip; a few are straight to slightly convex; frequently serrated.

Shoulders: None.

Stem: Notches flaked upward from base form both stem and barbs, usually of approximately equal width; base convex to straight.

Average dimensions: Length, 39 mm. (1.56 inches); width, 22 mm. (0.87 inch); thickness, 4 mm. (0.15 inch).

Provenience: See table 3.

Remarks: These points appear at about the same level as the Perdiz Pointed Stems, although the latter seem to predominate in the uppermost levels. The type is known from Henrietta Focus, north central Texas (Krieger, 1946, p. 140), and the Gibson Aspect in northeastern Texas (Krieger, 1946, p. 157). It is earlier in the Gibson Aspect foci than in Henrietta Focus and ranges in time perhaps from A. D. 1200 to 1650.

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[10] Kelley, personal conference.

[11] Kelley, personal conference.

Kobs Triangular (pl. 35, *i, j*); 34 specimens.

Proportions: Medium to long.

Blade: Usually concave from base to midblade, convex to tip; a few are straight to convex, sometimes serrated; basically triangular.

Base: Usually convex.

Average dimensions: Length, 45 mm. (1.78 inches); width, 22 mm. (0.87 inch); thickness, 4 mm. (0.15 inch).

Provenience: See table 3.

Remarks: These points have all the shape and size characteristics of the Alba Barbed type except the notching, which produces both stem and barbs in the latter. Distribution is considered to be generally similar, as well, with perhaps a greater concentration of the Kobs Triangular in the eastern range of the type.[12]

MISCELLANEOUS UPPER LEVEL TYPES

Provisional Type 1 (pl. 35, *p*); 4 specimens.

Proportions: Long and narrow.

Blade: Edges convex.

Shoulders: Prominent but obscured by flaring stem.

Stem: Wide expanding stem formed by deep U-shaped lateral or diagonal notches; strongly convex base.

Dimensions (only one whole specimen): Length, 50 mm. (1.96 inches); width, 21 mm. (0.87 inch); thickness, 5 mm. (0.20 inch).

Provenience: See table 3.

Remarks: These are larger than usual for upper level projectile points. The workmanship is good. Distribution in time and space is unknown.

Provisional Type 2 (pl. 35, *m–o*); 3 specimens.

Proportions: Long and narrow.

Blade: Slightly convex edges and rather thick in cross section.

Shoulders: Tend to squareness but are not prominent.

Stem: Relatively short and squarish with parallel edges and bases somewhat convex.

Average dimensions: Length, 65 mm. (2.56 inches); width, 19 mm. (0.75 inch); thickness, 8 mm. (0.31 inch).

Provenience: See table 3.

Remarks: Like Provisional Type 1, these are longer than is common in upper level types. Workmanship is above average for this area. Temporal and areal distribution unknown.

Provisional Type 3 (pl. 35, *k*); 1 specimen.

Proportions: Medium; blade broad, stem relatively long.

Blade: Edges straight.

Shoulders: Poorly defined.

Stem: Concave edges; contracts gently from the shoulders to midstem from where it expands to a slightly concave base; stem and basal edges heavily ground.

Dimensions: Length 28 mm. (1.09 inches) of which 12 mm. (0.46 inch) is blade length; width, 15 mm. (0.59 inch); thickness obscured by thermal fracture on both faces of the blade.

Provenience: See table 3.

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[12] Krieger, personal conference.

Provisional Type 4 (pl. 35, *l*); 1 specimen.

Proportions: Medium.

Blade: Edges parallel to midblade, asymmetrically convex to tip; edges ground smooth along parallel portion.

Base: Concave.

Dimensions: Length, 39 mm. (1.56 inches); width, 19 mm. (0.75 inch); thickness, 7 mm. (0.28 inch).

Provenience: See table 3.

Remarks: The end of the blade has been roughly reflaked to its present asymmetric shape. It seems likely that this is an earlier piece which had been picked up and reused by the later occupants of the site. Spatial and temporal distribution unknown.

MIDDLE AND LOWER LEVEL PROJECTILE POINTS

Gary Stemmed (pl. 36, *a–y*); 518 specimens.

Proportions: Commonly medium, but a few are of broad or narrow proportions.

Blade: Edges vary from convex to somewhat concave and are frequently asymmetrical.

Shoulders: Prominent, rarely barbed; an occasional point has only one shoulder.

Stem: Usually contracts from the shoulder to form a tapered or rounded stem, although a very few have parallel or even slightly expanding sides. Base is normally pointed, but in some cases is convex or straight. The majority of these convex or straight base points are the result of leaving the unmodified original striking platform of the flake to form the butt of the stem. Asphaltum was often used on the stem as an adhesive for binding it to the shaft.

Average dimensions: Length, 47 mm. (1.87 inches); width, 26 mm. (1.03 inches); thickness, 8 mm. (0.31 inch). There is a considerable size range in these points, depending somewhat upon material and workmanship.

Provenience: See table 4.

Remarks: The Gary Stemmed point is the most characteristic type of the middle levels. Workmanship ranges from extremely crude percussion flaked examples to well-made pressure retouched points. This depends in part upon the material: Flint, quartzite, mineralized wood, and one point of fine-grained sandstone. Typologically similar projectile points have a wide range both in space and time. Without attempting to give a complete distribution, a few pertinent occurrences may be noted. It is similar to, if not identical with, the simple haft 1 B of the Tchefuncte period (Ford and Quimby, 1945, fig. 8, *h*, *i*), and most, if not all, of the points designated as types simple haft 1 A, 1 C, 1 D, 2 A, 2 B, and 2 C of the Marksville period (Ford and Willey, 1940, figs. 45, 46). Poverty Point in northern Louisiana (Webb, C. H., 1948, fig. 44, 1, 2, and 4); sites Lu^{v} 65, Lu^{o} 67, Lu^{o} 72, Lu^{v} 92, and Ct^{o} 27 in the Pickwick Basin (Webb, Wm. S. and DeJarnette, 1942, pls. 207, 226, 227, 236, 257, and 293); site 5 in the Norris Basin (Webb, Wm. S., 1938, pl. 31 *b*); Indian Knoll (Webb. Wm. S., 1946, fig. 32, *c*); Lake Tohopekaliga, Florida (Watson, 1948, fig. 23, *g*, *h*); and Stalling's Island (Claflin, 1931, pls. 55, 56) all yield points of a similar pattern. It is common in pottery sites in northeast Texas (Krieger, 1946, p. 117). Furthermore, it is listed as one of the most common forms of the Woodland Pattern of the northern United States (Anonymous, 1943, p. 396 and fig. 39, I *b*). The temporal distribution within this geographical range is Archaic to Temple Mound II, perhaps later. Within the sites of the Addicks Basin, the Gary Stemmed point earlier displaces a group of expanding stemmed points in favor, and is finally, itself, largely replaced by the small arrow points of the upper levels. The variation within the type range of the Addicks specimens seems to have little, if any, chronological significance per se. The importance of the group lies in the predominant role it played during the middle level of occupation.

TABLE 4.—*Provenience of Middle and Lower Level types of projectile points* [1]

Projectile point type	Site	Level									Total
		0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120	Unlocated	
Gary Stemmed	D	6	25	32	48	52	30	11	1	*243	448
	K	1	5	13	10	9	2	4	2	------	47
	4	------	------	------	2	2	2	------	------	------	6
	G	------	------	1	4	8	4	------	------	------	17
Wells Ctg. Stem	G	------	------	------	------	------	1	------	------	------	1
Type P-5	D	------	------	------	------	------	------	------	------	*1	1
	G	------	------	------	------	------	1	------	------	------	1
Type P-6	D	------	2	2	2	------	2	5	------	*12	25
Type P-7	D	------	------	1	------	1	3	2	2	*13	22
	K	------	------	------	1	------	------	------	------	------	1
Type P-8	D	------	------	------	1	3	2	2	------	*4	12
	K	------	------	------	1	------	------	------	------	------	1
Type P-9	D	------	1	------	------	2	2	------	------	*1	6
	G	------	1	------	------	1	------	------	------	------	2
Type P-10	D	------	------	1	------	1	------	------	------	*2	4
	K	------	------	------	------	3	------	------	------	------	3
	5	------	------	------	------	------	------	------	------	2	2
Type P-11	D	------	------	1	------	1	4	2	------	*12	20
	K	------	------	------	------	1	------	------	------	------	1
	G	------	------	------	------	1	------	------	------	------	1
Type P-12	D	------	------	------	1	3	1	1	------	*22	28
Type P-13	D	------	1	------	------	------	------	------	------	*2	3
	K	------	------	------	------	1	------	------	------	------	1
	G	------	------	------	------	------	2	------	------	------	2
Type P-14	D	------	------	------	------	------	------	------	1	*7	8
Type P-15	D	------	------	------	------	------	------	1	------	------	1
Type P-16	K	------	------	------	------	1	------	1	------	------	2
Type P-17	D	------	------	------	------	------	1	------	------	*4	5
Type P-18	D	------	------	------	1	1	2	3	------	*7	14
	K	------	------	------	------	------	------	1	------	------	1
Type P-19	D	------	------	------	------	------	------	1	------	*16	17
	5	------	------	------	------	------	------	------	------	1	1
Type P-20	D	------	------	------	------	------	1	2	------	*3	6
Pedernales Ind	D	------	------	------	------	------	1	------	------	*1	2
Type P-21	D	------	------	------	1	------	------	1	------	------	2
Type P-22	D	------	------	------	1	------	1	------	------	*8	10
	K	------	------	------	------	1	------	------	------	------	1
	G	------	------	------	1	------	------	------	------	------	1
Type P-23	D	------	------	------	------	2	2	1	------	*14	19
	K	------	------	------	------	1	------	------	------	------	1
	G	------	------	------	------	------	1	------	------	------	1
Type P-24	D	------	------	------	1	1	------	------	------	------	2
	K	------	------	------	------	------	------	------	------	1	1
Clovis Fluted (?)	D	------	------	------	------	------	------	1	------	------	1

[1] Symbols: D=Doering, K=Kobs, 4=42/66A6-4, 5=42/66A6-5, G=Grisbee sites; Type P=Provisional type; Pedernales Ind.=Pedernales Indented Base: *=Stream bed collection from Doering site.

Provisional Type 5 (pl. 37, *o*); 2 specimens.

Proportions: Medium.

Blade: Edges convex.

Shoulders: Well defined.

Stem: Short, contracting, bifurcate.

Dimensions (1 specimen): Length, 41 mm. (1.61 inches); width, 22 mm. (0.87 inch); thickness, 11 mm. (0.43 inch).

Provenience: See table 4.

Wells Contracting Stem (pl. 37, *s*); 1 specimen (broken).

Proportions: Narrow.

Blade: Less wide than stem, edges convex (?); distal end broken.

Shoulders: None.

Stem: Long, narrow, contracts from midpoint of blade; base straight; stem and basal edges ground smooth.

Dimensions: Length, *circa* 70 mm. (?) (2.75 inches); width, 19 mm. (0.75 inch); thickness, 7 mm. (0.28 inch). Length of stem, 32 mm. (1.28 inches).

Provenience: See table 4.

Remarks: Basically a narrow leaf-shaped point. The stem is demarked by grinding and by a greater width than the blade, forming, in effect, a reverse shoulder. The known range of the Wells Contracting Stem form centers in northeast Texas and may be fairly late, but it is certainly precontact.

Provisional Type 6 (pl. 37, *d, e*); 25 specimens.

Proportions: Medium to narrow.

Blade: Edges convex to straight, rarely concave.

Shoulders: Usually poorly defined, sometimes square.

Stem: Slightly to widely expanding, formed by relatively broad and shallow notches diagonally flaked from the basal corners; bases mostly convex, occasionally straight.

Average dimensions: Length, 45 mm. (1.78 inches); width, 21 mm. (0.84 inch); thickness, 6 mm. (0.23 inch).

Provenience: See table 4.

Remarks: Although somewhat similar points occur in the Poverty Point site in northern Louisiana (Webb, C. H., 1948, fig. 44, 4), in general their temporal and geographical range is not known.

Provisional Type 7 (pl. 37, *f–h*); 23 specimens.

Proportions: Medium.

Blade: Edges convex.

Shoulders: Obscured by width of stem and base.

Stem: Flaring, as wide as blade; lateral notches are usually broad and shallow, sometimes narrow; bases generally straight.

Average dimensions: Length, 39 mm. (1.56 inches); width, 20 mm. (0.78 inch); thickness, 6 mm. (0.23 inch).

Provenience: See table 4.

Remarks: Rough but not poor workmanship and somewhat smaller than the majority of Middle and Lower Level points. The complete range in space and time is not known, but the shape occurs at site Ct° 27 in the Pickwick Basin (Webb. Wm. S., and DeJarnette, 1942, pl. 294, 1, type listed as No. 47); at site Ma° 4 in the Wheeler Basin (Webb, Wm. S., 1939, pl. 108, *b*); in Missouri (Wedel, 1943, pl. 12, *c–e*); and is listed as one of the basic shapes of the Woodland Pattern (Anonymous, 1943, fig. 39, *d*).

Provisional Type 8 (pl. 37, *i, j*); 13 specimens.

Proportions: Narrow to medium.

Blade: Forms a compound curve, concave from shoulders to midblade, convex to tip.

Shoulders: Prominent but not barbed.

Stem: Somewhat expanding, frequently ground smooth; base is straight to convex.

Average dimensions: Length, 60 mm. (2.37 inches); width, 25 mm. (0.96 inch); thickness, 8 mm. (0.31 inch).

Provenience: See table 4.

Remarks: These points are larger than average for the site, and the workmanship is good. The type is quite similar to the simple haft 1 A of the Tchefuncte and Marksville cultures (Ford and Quimby, 1945, fig. 8, *a*, *b*, *c*, and *e*) and to some of the points from site Ct^v 17 in the Wheeler Basin (Webb, Wm. S., 1939, pl. 27, *a*). Its complete range is not known.

Provisional Type 9 (pl. 37, *k*, *l*); 8 specimens.

Proportions: Broad.

Blade: Edges convex.

Shoulders: Slightly barbed, occasionally straight.

Stem: Gently to widely expanding, formed by notches from the basal corners; bases are convex.

Average dimensions: Length, 35 mm. (1.37 inches); width, 24 mm. (0.93 inch); thickness, 5 mm. (0.20 inch).

Provenience: See table 4.

Remarks: Complete areal and spatial distribution unknown, but at least one other southeastern occurrence is at Hiwassie Island (Lewis and Kneberg, 1946, pl. 66B, upper row).

Provisional Type 10 (pl. 37, *m*, *n*); 9 specimens.

Proportions: Narrow.

Blade: Edges gently convex.

Shoulders: Obscured by width of stem.

Stem: Expanding, formed by broad, shallow, lateral notches; base convex; basal and notch edges frequently smoothed by grinding.

Average dimensions: Length, 40 mm. (1.59 inches); width, 17 mm. (0.68 inch); thickness, 6 mm. (0.23 inch).

Provenience: See table 4.

Provisional Type 11 (pl. 37, *a–c*); 20 specimens.

Proportions: Medium to narrow.

Blade: Edges predominantly straight but some show slight convexity or concavity.

Shoulders: Not prominent, obscured by wide expanding stem.

Stem: Expanding to flaring; formed by broad, shallow, irregular, lateral notches some distance above the base; base usually convex but sometimes straight.

Average dimensions: Length, 54 mm. (2.12 inches); width, 22 mm. (0.87 inch); thickness, 8 mm. (0.31 inch).

Provenience: See table 4.

Remarks: Appears in site Mg^v 2 in the Wheeler Basin, an early horizon (Webb, Wm. S., 1939, pl. 83, *a*, row 3, No. 2), and also in Mississippi (Brown, 1926, fig. 28, second row, last two specimens), but without context. Its complete distribution in space and time is not known.

Provisional Type 12 (pl. 37, p, q); 28 specimens.

Proportions: Narrow to medium.

Blade: Edges form compound curve, concave from shoulders to midblade, convex to tip.

Shoulders: Prominent, rarely barbed.

Stem: Vary from slightly contracting to somewhat expanding, frequently of a bulbous shape and smoothed by abrasion; stem constitutes from one-third to one-fourth of the total length of the point; base convex to rounding.

Average dimensions: Length, 65 mm. (2.56 inches); width, 25 mm. (0.96 inch); thickness, 8 mm. (0.31 inch).

Provenience: See table 4.

Remarks: In general appearance this type is quite similar to Provisional Type 8, the chief difference being in the consistently longer, occasionally bulbous stem of the present type. Temporal and spatial distribution unknown.

Provisional Type 13 (pl. 37, *r*); 6 specimens.

Proportions: Medium.

Blade: Edges convex to straight.

Shoulders: Slightly barbed to poorly defined.

Stem: Relatively long, parallel-sided; bases indented; basal and stem edges sometimes ground.

Average dimensions: Length, 55 mm. (1.65 inches); width, 23 mm. (0.90 inch); thickness, 7 mm. (0.28 inch).

Provenience: See table 4.

Remarks: Points of similar shape but generally larger and inferior in workmanship occur over a wide range to the west of the Addicks Basin. They seem to center on the Edwards Plateau, occurring as far north as Abilene (Sayles, 1935, pl. 14, *b*, *c*, and *g*), west to the Pecos River (Pearce and Jackson, 1933, pl. 12, *a*, 6), east to the Black and Grand Prairies near Dallas (Bryan, 1930, pl. 24, 4), and on the plateau proper (Jackson, 1938, pl. 4, 1; Pearce, 1932 a, pl. 10, No. 20; and Kelley, 1947, pl. 14, 1).

Provisional Type 14 (pl. 37, *t*); 8 specimens.

Proportions: Narrow.

Blade: Edges straight to slightly convex.

Shoulders: Barbed.

Stem: Short relative to total point length, gently expanding; base straight.

Average dimensions: Length, 45 mm. (1.78 inches); width, 22 mm. (0.87 inch); thickness, 4.50 mm. (0.17 inch).

Provenience: See table 4.

Provisional Type 15 (pl. 38, *a*); specimen.

Proportions: Narrow.

Blade: Convex.

Shoulders: Indeterminate because of broken condition of point.

Stem: Basically parallel-sided, edges slightly concave; base somewhat concave; stem and basal edges ground smooth.

Dimensions: Length, circa 80 mm. (?) (3.14 inches); width, 21 mm. (0.84 inch); thickness, 7 mm. (0.28 inch).

Provenience: See table 4.

Remarks: Specimen broken and small central segment was not recovered. Workmanship excellent, the flaking of the blade is basically collateral with minute retouching along the blade edges. This point somewhat resembles the Scottsbluff points which Webb (Webb, C. H., 1948, fig. 45, Nos. 1–5) reports from northern Louisiana. If it actually falls into that category, the Addicks Basin find marks the southernmost occurrence yet noted.

Provisional Type 16 (pl. 38, *b*); 2 specimens.

Proportions: Medium.

Blade: Basically leaf-shaped, edges convex from tip to intersection with stem.

Shoulders: None.

Stem: Parallel-sided or slightly contracting; base concave; basal and stem edges ground.

Dimensions (larger specimen): Length, 67 mm. (2.64 inches); width, 31 mm. (1.21 inches); thickness, 9 mm. (0.36 inch).

Provenience: See table 4.

Remarks: Workmanship excellent with broad, parallel flakes on the faces of the blade. Typologically similar points occur at Nebo Hill in western Missouri (Shippee, 1948, pl. 2, Ah, Ch) where they are considered to be reworked blades from the more typical elongate, lanceolate variety. Others somewhat resembling these occur at site Ft–42 on Lime Creek in Nebraska (Schultz and Frankforter, 1948, fig. 12, specimen 7555).

Provisional Type 17 (pl. 38, *c*); 5 specimens.

Proportions: Medium to narrow.

Blade: Convex edges describe parabola from shoulder to tip.

Shoulders: Prominent, square.

Stem: Square, edges parallel; base straight.

Average dimensions: Length, 59 mm. (2.32 inches); width, 25 mm. (0.96 inch); thickness, 8 mm. (0.31 inch).

Provenience: See table 4.

Remarks: Workmanship is excellent. Points of this type occur in site Lu° 86 in the Wheeler Basin (Webb, Wm. S., 1939, pl. 12, *b*), in Indian Knoll (Webb, Wm. S., 1946, fig. 32, *a*, rows 1 and 2), and the type is listed as one of the basic Woodland Pattern shapes (Anonymous, 1943, fig. 39, Ie).

Provisional Type 18 (pl. 38, *d*); 15 specimens.

Proportions: Medium.

Blade: Edges convex.

Shoulders: Prominent to barbed.

Stem: Slightly expanding, formed by diagonal notches from the basal corners; bases convex.

Average dimensions: Length, 55 mm. (2.16 inches); width, 32 mm. (1.28 inches); thickness, 6 mm. (0.23 inch).

Provenience: See table 4.

Provisional Type 19 (pl. 38, *e, f*); 18 specimens.

Proportions: Medium.

Blade: Edges straight, occasionally serrated.

Shoulders: Prominent.

Stem: Large relative to total point size; edges usually parallel; base slightly concave to convex, generally straight; basal and stem edges may be lightly ground.

Average dimensions: Length, 55 mm. (2.16 inches); width, 29 mm. (1.14 inches); thickness, 7 mm. (0.28 inch).

Provenience: See table 4.

Remarks: Points of this shape occur in Mississippi (Brown, 1926, fig. 28, row 4, second and third specimens), at site Lu^{v} 92 in the Pickwick Basin (Webb, Wm. S. and DeJarnette, 1942, pl. 257, 1, second row second specimen), and are a component of the collections from the Morhiss site[13] in Victoria County, Tex., southwest of the Addicks Basin.

Provisional Type 20 (pl. 38, *g, h*); 6 specimens.

Porportions: Medium to narrow.

Blade: Edges convex.

Shoulders: Usually obscured by flaring stem.

Stem: Flaring, sometimes as wide as blade, formed by lateral notches immediately above the base; base straight.

Average dimensions: Length, 50 mm. (1.96 inches); width, 25 mm. (0.96 inch); thickness, 6 mm. (0.23 inch).

Provenience: See table 4.

Remarks: Points of this characteristic shape occur in a considerable size range, the larger ones appearing in the Southeast, both as knives and as projectile points (Webb, Wm. S. and DeJarnette, 1942, pl. 236, middle row, third specimen from right), in the Central Plains area (Wedel, 1943, pl. 12, *a–g*), and the type is one of the basic Woodland Pattern shapes (Anonymous, 1943, fig. 39, Ia).

Pedernales Indented Base (pl. 38, *i*); 2 specimens.

Proportions: Medium to narrow.

Blade: Edges convex to straight.

Shoulders: Straight to slightly barbed.

Stem: Edges parallel; base concave to deeply indented.

Dimensions: Length, probably 90 to 100 mm. (3.53 to 3.92 inches) (both specimens broken); width, 37 and 40 mm. (1.46 and 1.59 inches); thickness, 7 and 9 mm. (0.28 and 0.36 inch).

Provenience: See table 4.

Remarks: This type of point is characteristic of sites along the middle course of the Colorado River of central Texas.[14]

Provisional Type 21 (pl. 38, *j*); 2 specimens.

Proportions: Narrow.

Blade: Broad relative to total length; edges convex.

Shoulders: Well defined.

Stem: Long relative to total length; edges parallel; base straight; stem edges ground.

Dimensions: Length, 35 and 45 mm. (1.37 and 1.78 inches); width, 24 mm. (0.93 inch); thickness, 5 mm. (0.20 inch).

Provenience: See table 4.

Remarks: The distribution of this type is poorly known. One occurrence of a similar point is at site No. 5 in the Norris Basin in eastern Tennessee (Webb, Wm. S., 1938, pl. 31, third row, second from left).

Provisional Type 22 (pl. 38, *n*); 12 specimens.

Proportions: Narrow to medium.

Blade: Edges convex.

Shoulders: Well defined.

Stem: Slightly expanding; base convex to straight.

Average dimensions: Length, 36 mm. (1.43 inches); width, 16 mm. (0.63 inch); thickness, 5 mm. (0.20 inch).

Provenience: See table 4.

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[13] Collections in Museum of Anthropology, University of Texas, Austin, Tex.

[14] Kelley, personal conference.

Provisional Type 23 (pl. 38, *k*); 21 specimens.

Proportions: Narrow.

Blade: Edges strongly convex.

Base: Convex to round.

Average dimensions: Length, 55 mm. (2.16 inches); width, 20 mm. (0.78 inch); thickness, 9 mm. (0.36 inch).

Provenience: See table 4.

Remarks: The leaf-shaped blade is one of the basic types of the Woodland Pattern (Anonymous, 1943, fig. 39, If). It is likely that these specimens are too small to have been used for anything but projectile points. Much larger pieces of the same shape also occur and are discussed below under the heading Knives.

Provisional Type 24 (pl. 38, *m*); 3 specimens (broken).

Proportions: Medium to broad.

Blade: Convex edges converge strongly toward tip.

Base: Concave with several parallel longitudinal basal thinning flakes on either face of the blade; very small lateral notches immediately above the base give the effect of ears; basal and notch edges ground smooth.

Dimensions: Length, probably near 35 mm. (1.37 inches); width, 29 mm. (1.14 inches); thickness, 5 mm. (0.20 inch).

Provenience: See table 4.

Clovis Fluted (?) (pl. 38, *l*); 1 specimen (broken).

Proportions: Indeterminate, probably narrow.

Blade: Edges convex, expanding from base toward midblade; lateral edges ground; fluted on both faces.

Base: Concave, basal edge ground.

Dimensions: Indeterminable; present length, 40 mm. (1.59 inches).

Provenience: See table 4.

Remarks: Two fragments of this point were recovered, one from the stream bed, the other from the Doering midden, and fitted together. It is interesting to note that the piece from the stream bed is patinated a tannish cream color while the fragment from the midden is colored a very light cream. This is an excellent demonstration of the effect of immediate environment on patination. The southern distribution of the fluted forms is poorly known, very few having been found in context. They occur in the Abilene region to the west (Bryan, Kirk and Ray, C. N., 1938) and in northern Louisiana (Webb, C. H., 1948, fig. 45, 6–8) to the north. While this occurrence may argue for a relatively recent survival of the type, it is the opinion of the writer that it represents a fossil point picked up and reused by the later occupants.

UNPLACED PROJECTILE POINT TYPES

All of the following projectile points, with the exception of No. *c*, Plate 39, from site 42/66A6–5, are from the stream bed at the Doering site. Since they were not duplicated in the excavated series, their relative stratigraphic position may only be inferred at the present time.

Provisional Type 25 (pl. 39, *b*); 1 specimen.

Proportions: Narrow.

Blade: Edges convex.

Shoulders: Well defined.

Stem: Relatively long, contracting from shoulders; base straight.

Dimensions: Length, 62 mm. (2.45 inches); width, 28 mm. (1.09 inches); thickness, 11 mm. (0.43 inch).

Provisional Type 26 (pl. 39, *c*); 1 specimen.

Proportions: Narrow.

Blade: Concave to midblade and convex to tip (broken); beveled on opposite faces.

Shoulders: Poorly defined.

Stem: Contracts from shoulders and then expands slightly to base; base concave; stem and basal edges heavily ground.

Dimensions: Length, indeterminate; width, 19 mm. (0.75 inch); thickness, 7 mm. (0.28 inch).

Remarks: This form resembles, superficially at least, the beveled points of the Brazos River Phase of Sayles (1935, pl. 11, *a–e*).

Provisional Type 27 (pl. 39, *h*); 2 specimens (broken).

Proportions: Medium.

Blade: Edges straight.

Shoulders: Prominent, square.

Stem: Large, contracting, with straight edges; base convex; basal and stem edges ground.

Dimensions: Length, about 70 mm. (2.75 inches); width, 37 mm. (1.46 inches); thickness, 8 mm. (0.31 inch).

Remarks: Workmanship excellent. These points occur in the Morhiss site in Victoria County, Tex.[15]

Provisional Type 28 (pl. 39, *g*); 1 specimen (broken).

Proportions: Narrow.

Blade: Edges convex.

Shoulders: Well defined, square.

Stem: Large, contracting, with convex edges; base probably round or pointed; stem edges ground.

Dimensions: Length, about 95 mm. (?) (3.73 inches); width, 30 mm. (1.18 inches); thickness, 7 mm. (0.28 inch).

Remarks: This form also occurs as a component of the Morhiss site lithic complex. Workmanship excellent.

Provisional Type 29 (pl. 39, *i, j*); 4 specimens.

Proportions: Medium over-all with broad blade.

Blade: Edges straight to convex.

Shoulders: Medium.

Stem: Long and wide, edges parallel; base convex.

Dimensions: Length, 38 mm. (1.50 inches); width, 21 mm. (0.84 inch); thickness, 6 mm. (0.23 inch). Stems average 21 mm. (0.84 inch) in length.

Remarks: Because of the relative size of the stems, there is a possibility that these are reworked from larger points, although only one seems actually to have been rechipped. On the whole, it seems likely that they constitute a type. A single example of the type is illustrated by Moorehead (1931, fig. 2, lower row, third specimen) from Yell County, Ark., and another similar point from site JO 2, an Adena site in eastern Kentucky (Webb, Wm. S., 1942, pp. 310, 315, and fig. 7, 3K), but the complete range in time and space is unknown.

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[15] Collections, Museum of Anthropology, University of Texas, Austin, Tex.

Provisional Type 30 (pl. 39, *k, l*); 6 specimens.

Proportions: Medium.

Blade: Edges straight to somewhat convex.

Shoulders: Medium.

Stem: Edges parallel to slightly expanding; bases straight and tend to form a square with the stem.

Average dimensions: Length, 38 mm. (1.50 inches); width, 24 mm. (0.93 inch); thickness, 7 mm. (0.28 inch).

Provisional Type 31 (pl. 39, *d*); 1 specimen (broken).

Proportions: Medium.

Blade: Asymmetric, edges convex.

Shoulders: One side has a small barb, the other a broad, long, curved barb.

Stem: Shape unknown, probably asymmetric in direction opposite to large barb.

Dimensions: Length, about 43 mm. (?) (1.71 inches); width, 33 mm. (1.31 inches); thickness, 4 mm. (0.15 inch).

Provisional Type 32 (pl. 39, *e*); 1 specimen (broken).

Proportions: Broad.

Blade: Edges convex.

Shoulders: Prominent.

Stem: Short, broad, with slightly expanding edges; base convex; stem and basal edges ground.

Dimensions: Length, indeterminate; width, 28 mm. (1.09 inches); thickness, 5 mm. (0.20 inch).

Copena Point (pl. 39, *a*); 1 specimen.

Proportions: Narrow.

Blade: Edges form compound curve, concave just above the base, convex at midblade, and then concave to the tip.

Base: Slightly convex.

Dimensions: Length, 76 mm. (2.98 inches); width, 21 mm. (0.84 inch); thickness, 9 mm. (0.36 inch).

Remarks: This point corresponds to the less finished type as reported by Webb and DeJarnette (1942, pl. 207, 2) for the Pickwick Basin.

Plainview Point (pl. 39, *f*); 1 specimen.

Proportions: Narrow.

Blade: Parallel edges, asymmetrically convex to tip; end of blade resharpened by much inferior technique; flaking basically collateral with parallel flake scars meeting along a slight dorsal ridge; lateral edges ground.

Base: Slightly concave; edge ground.

Dimensions: Length, 39 mm. (1.56 inches); width, 17 mm. (0.68 inch) at mid-blade; thickness, 4 mm. (0.15 inch).

Remarks: Although its dimensions are somewhat less than those of points from the type station (Sellards, Evans, Meade, and Krieger, 1947, p. 939 and table 4, pp. 943, 944), this specimen probably should be considered a Plainview point.[16]

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[16] Krieger, personal conference.

Baird Beveled Point (pl. 39, *m, n*); 2 specimens.

Proportions: Medium.

Blade: Triangular, edges straight; longitudinal thinning flakes on both faces of one, on one face of the other.

Base: One concave, one convex.

Dimensions: Length, 41 and 44 mm. (1.61 and 1.75 inches); width, 26 and 27 mm. (1.03 and 1.06 inches); thickness, 6 mm. (0.23 inch).

Remarks: Points of this form occur both in central Texas (Ray, C. N., 1938, pl. 25, l, row 5, Clear Fork Dart 3; and Kelley, 1947 b, pl. X, 6) and in the South Gulf Coastal area (Sayles, 1935, pl. 25, *h*). These points may, therefore, represent trade relations with either area, although the central Texas area seems most likely since several other central Texas types also occur as trade specimens.

PROJECTILE POINT STRATIGRAPHY

An examination of table 5 and figure 22 reveals several trends significant in the establishment of a relative chronology for the Addicks Dam Basin sites. Considering the Doering site alone for the moment, these are: (1) The greater variety of miscellaneous point types from the lower levels in relation to the Gary Stemmed group (except level 105–120 where the number of points recovered is too small to be statistically important); (2) the increasing dominance of the Gary type to level 30–45, in which it constitutes nearly 85 percent of all forms present; (3) the increasing importance of the Perdiz Pointed Stem and its associated forms in the two upper levels of the site.

As already mentioned above, the data of the lowest level are insecure, since only four points were found. It is perhaps significant that only one of these, or 25 percent of the total for that level, was of the Gary Stemmed type; but the smallness of the sample renders unsound any definite conclusions based on the occurrence of this type.

From level 90–105 up, however, the evidence is clear that the miscellaneous group of points, nearly all of which are expanding or parallel-sided stemmed varieties, give way, as a group, as the Gary Stemmed type gains in favor and importance.

The appearance of the Perdiz Pointed Stem, Alba Barbed, and associated types marks the initiation of the rapid encroachment of the small projectile points. This event probably heralds the introduction of the bow and arrow. The occurrence of a single Perdiz Pointed Stem point in each of levels 60–75, 45–60, and 30–45 poses an interesting problem. It may be that the Doering site peoples, through trade, warfare, or otherwise, had come into contact with peoples already using the type some time prior to its main introduction. It is likewise possible that, although introduced earlier, it did not gain a strong foothold until relatively late in the occupancy of the site. The most probable explanation, however, at least for the two lower occurrences, is that they represent dislocations due to dis-

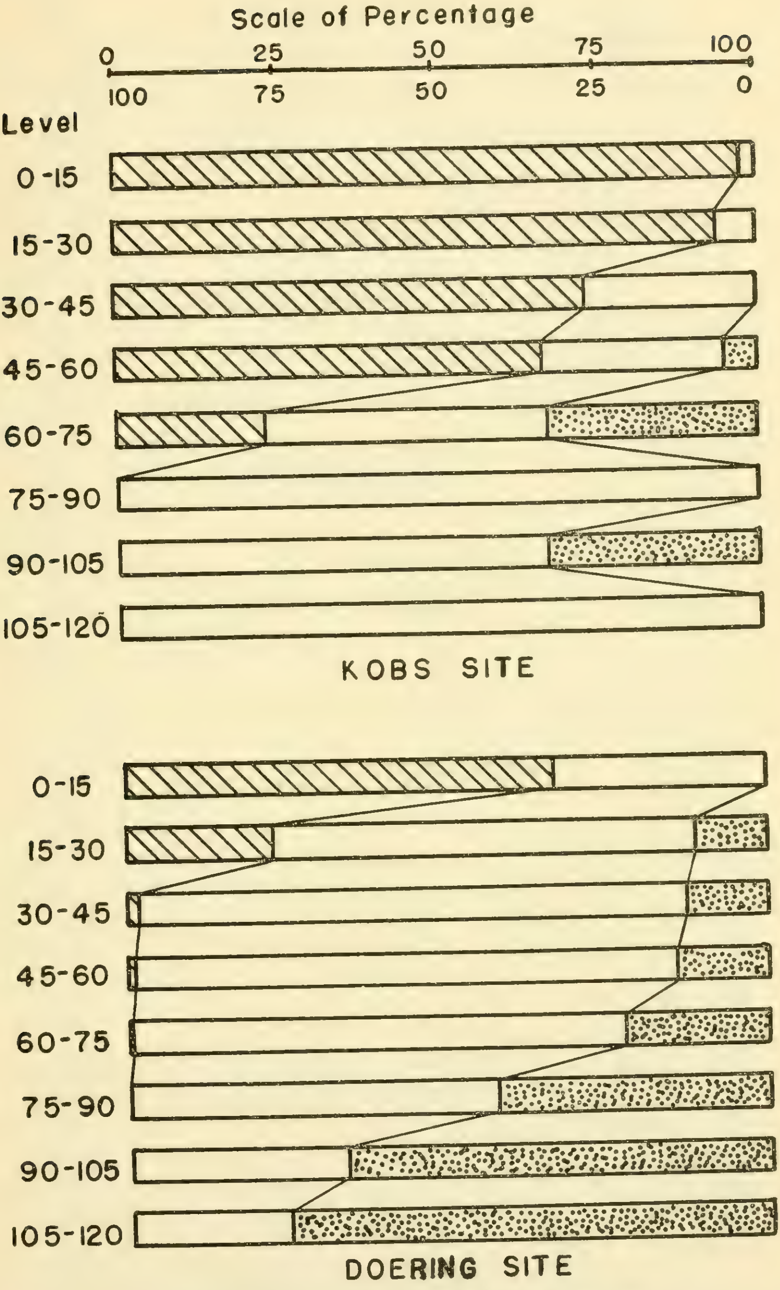

Figure 22.—Graph showing comparative projectile point stratigraphy of Doering and Kobs sites. Diagonal hatching, upper level types; blank, Gary Stemmed type; dotted area, other lower and middle level types.

TABLE 5.—*Percentage distribution of projectile points from Doering and Kobs sites by type and level*[1]

Projectile point type	Percentage distribution of projectile points in indicated levels—Doering site															
	0–15		15–30		30–45		45–60		60–75		75–90		90–105		105–120	
	No.	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*
Perdiz Pointed Stem	8	44.44	5	13.15	1	2.63	1	1.75	1	1.47						
Scalhorn Stemmed	2	11.11														
Eddy Stemmed	1	5.55														
Alba Barbed			2	5.26												
Kobs Triangular			1	2.63												
Provisional Type 1	1	5.55	1	2.63												
Provisional Type 2																
Provisional Type 3																
Provisional Type 4																
Gary Contracting Stem	6	33.33	25	65.75	32	84.16	48	84.00	52	76.44	30	57.60	11	34.37	1	25.00
Provisional Type 6			2	5.26	2	5.26	2	3.50			2	3.84	5	15.62		
Provisional Type 7					1	2.63			1	1.47	3	5.76	2	6.25	2	50.00
Provisional Type 8							1	1.75	3	4.41	2	3.84	2	6.25		
Provisional Type 9			1	2.63					2	2.94	2	3.84				
Provisional Type 10					1	2.63			1	1.47						
Provisional Type 11					1	2.63			1	1.47	4	7.69	2	6.25		
Provisional Type 12							1	1.75	3	4.41	1	1.92	1	3.12		
Provisional Type 13			1	2.63												
Provisional Type 14															1	25.00
Provisional Type 15													1	3.12		
Provisional Type 16																
Provisional Type 17											1	1.92				
Provisional Type 18							1	1.75	1	1.47	2	3.84	3	9.37		
Provisional Type 19													1	3.12		
Provisional Type 20											1	1.92	2	6.25		
PedernalesIndentedBase											1	1.92				
Provisional Type 21							1	1.75					1	3.12		
Provisional Type 22							1	1.75			1	1.92				
Provisional Type 23									2	2.94	2	3.84				
Provisional Type 24							1	1.75	1	1.47						
Clovis Fluted (?)													1	3.12		
Total	18	100.00	38	100.00	38	100.00	57	100.00	68	100.00	52	100.00	32	100.00	4	100.00

Projectile point type	Percentage distribution of projectile points in indicated levels—Kobs site															
	0–15		15–30		30–45		45–60		60–75		75–90		90–105		105–120	
	No.	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*	*No.*	*Pct.*
Perdiz Pointed Stem	32	66.56	38	54.72	9	21.95	6	16.66	1	4.76						
Scalhorn Stemmed	1	2.08			3	7.31	2	5.55								
Eddy Stemmed	4	8.33	9	13.04	1	2.43	2	5.55								
Alba Barbed	4	8.33	10	14.49	3	7.31	8	22.22	1	4.76						
Kobs Triangular	6	12.50	6	8.69	10	24.39	4	11.11	2	9.52						
Provisional Type 1							1	2.77								
Provisional Type 2			1	1.44			1	2.77	1	4.76						
Provisional Type 3					1	2.43										
Provisional Type 4					1	2.43										
Gary Contracting Stem	1	2.08	5	7.24	13	31.70	10	27.77	9	42.85	2	100.00	4	66.66	3	100.00
Provisional Type 6																
Provisional Type 7							1	2.77								
Provisional Type 8							1	2.77								
Provisional Type 9																
Provisional Type 10									2	9.52						
Provisional Type 11									1	4.76						
Provisional Type 12																
Provisional Type 13									1	4.76						
Provisional Type 14																
Provisional Type 15																
Provisional Type 16									1	4.76			1	16.66		
Provisional Type 17																
Provisional Type 18													1	16.66		
Provisional Type 19																
Provisional Type 20																
PedernalesIndentedBase																
Provisional Type 21																
Provisional Type 22									1	4.76						
Provisional Type 23									1	4.76						
Provisional Type 24																
Clovis Fluted (?)																
Total	48	100.00	69	100.00	41	100.00	36	100.00	21	100.00	2	100.00	6	100.00	3	100.00

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[1] Provisional Type 5 was found only at the Grisbee site and therefore does not appear in this table.

turbances caused by rodent action or the digging of burial or other pits during the normal course of living on the site.

Regardless of the interpretation given to the seemingly aberrant early occurrences of the Perdiz Pointed Stem points, once the small points became firmly established they quickly replaced the larger, heavier Gary Stemmed group in favor and comprise 66 percent of the forms recovered from the upper levels.

Turning now to the Kobs site, it may be noted that stratigraphically the most important factor is the continuation of the trend observed in the upper levels of the Doering site, the growing dominance of the small projectile points. Indeed, in the uppermost level this trend results in an almost complete replacement of the Gary Stemmed and associated point types.

Below level 60–75 in the sand knoll, too few points were recovered to constitute satisfactory evidence. This is not surprising when it is recalled that below this level occupation must have been on a somewhat intermittent basis, since it did not result in the formation of a true midden deposit. The majority of the 11 points from the sand knoll are of the Gary Stemmed type. On the basis of the projectile points alone, the lower levels of the Kobs site would equate temporally with levels 45–60 and 30–45 of the Doering site; but the occurrence of Tchefuncte Stamped trade ware in the same horizon renders this interpretation unsatisfactory. On the whole, it seems best to reserve judgment on this matter.

In the lowest level of the midden deposit, however, the Perdiz Pointed Stem and associated types comprise 25 percent of all points found; the Gary Stemmed group, 43 percent; and miscellaneous middle level types comprise the remaining percentage. In the top level, the Perdiz Pointed Stem and cognate forms constitute 98 percent of the total points, having almost entirely replaced the larger types of the lower levels.

DISCUSSION

By regrouping into graphic form the comparative stratigraphic data for the Doering and Kobs sites, contained in table 5, the nature of the sequence may be more clearly visualized (fig. 22). The replacement of earlier expanding stemmed forms by the Gary Stemmed type, and the appearance and growing predominance of the Alba Barbed, Perdiz Pointed Stem, and associated types, offer a criterion of relative chronology. Disregarding, for the moment, the three Perdiz Pointed Stem occurrences from below level 15–30 at the Doering site, the most obvious correlation is between level 15–30, Doering site, and level 60–75, Kobs site. This correlation is largely borne out by a comparison of the relative percentages of the Gary Stemmed forms from the two sites. If, however, the level 60–75 appearance of the Perdiz Pointed Stem is not fortuitous, the correlation would be between level 60–75 at each site. For the most part, the first correlation seems the more likely one.

No adequate assessment of site 42/66A6–4 or of the Grisbee site is possible because of the limited nature of the testing operations carried on. Tentatively, however, they may be equated with the Kobs and Doering sites, using the appearance of the Perdiz Pointed Stem type as an arbitrary criterion of temporal equality. On this basis, level 30–45 of site 42/66A6–4 and level 45–60 of the Grisbee site (see table 3) would equate with level 60–75 of the Kobs site and level 15–30 or level 60–75 of the Doering site, depending upon the interpretation given the lowest stratigraphical occurrence of the Perdiz Pointed Stem points there.

The occurrences of projectile point types such as the Clovis Fluted (?), Scottsbluff (?), and Plainview points, and those resembling the Nebo Hill points (Provisional Type 16), in the Addicks Basin sites present themselves as an interesting problem but, nevertheless, are somewhat apart from the main chronological story. With the exception of the two resembling the Nebo Hill points, there is only one of each type, and one of these, the Plainview point, did not occur in context but rather in the stream bed. Whether it washed out of the midden, and if so, from what level, or whether it may have eroded out of the clay below the midden, cannot be answered. It is perhaps significant that the Clovis Fluted (?) and the Scottsbluff (?) points both occur in level 90–105, and the Provisional Type 16 (Nebo Hill (?)) points in the Kobs site sand knoll. Regardless of this, however, their chronological significance will remain obscure until they are found in a pure site or in sufficient concentration and in context to prove them Paleo-Indian, or until a body of data is gathered which demonstrates them to be a minor but consistent component of the lithic complex of the Southeastern Archaic. Until this situation has been resolved, it is best to lend little weight to their presence.

The most secure chronological tie of the projectile sequence lies in the upper level appearance of arrow points that have been dated elsewhere following different lines of evidence.[17] The arrival of the Perdiz Pointed Stem and related points probably was not before 1450 A. D. Once they were introduced, they rapidly replaced the larger and heavier dart points of the middle and lower levels. Going back in time from the upper level, the most significant factor is the decreasing frequency of a miscellaneous group of parallel-sided and expanding-stemmed projectile points whose distribution, where known, seems to be primarily among the earlier horizons of the Southeast. The percentage relationships of the various projectile point types may then tentatively express relative chronology.

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[17] Kelley, 1947 a, p. 127, uses a minimum date of 1500 A. D. Krieger, 1947, personal conference, dates the Alba Barbed and Perdiz Pointed Stem at circa 1450 A. D.

Turning now to extra-areal relations of the middle and lower levels, one of the most widespread projectile point types over the Southeast is the type here designated Gary Stemmed. Typologically similar points occur consistently in Stalling's Island, Indian Knoll, a number of sites in the Pickwick Basin, Poverty Point, and the Marksville and Tchefuncte horizons of the Lower Mississippi Valley.[18] The remainder of the middle and lower level points seem to occur sporadically throughout early sites and horizons of the Southeast, with some survival into later horizons as well. Of the 23 types for which some distributional data have been noted, 11 types comprising some 600 points appear to have an almost exclusive Southeastern distribution. Seven types, represented by a total of 15 points, are types whose distribution is essentially Texan, occurring for the most part in the sequences of the Edwards Plateau and the Abilene district. Four types, the Clovis Fluted (?), Scottsbluff (?), Nebo Hill (?), and the Plainview points have distributions in time and space which, as pointed out above, are at present beyond the scope of this paper. Provisional Type 19 occurs as a type both in the Southeast and in the Morhiss site on the Texas Gulf Coast. While the dearth of published material for certain parts of the Texas area to the west has probably introduced some distortions into the distributional picture, there is nevertheless an overwhelming majority of types which appear to be both early and Southeastern. The few examples of definite Texas types are, then, most easily explained as intrusive specimens. This solution accords well with the evidence of the ceramic complex, pointing to a basic Southeastern culture pattern.

The introduction of the arrow points of the Alba Barbed, Perdiz Pointed Stem, and the other related types, marks a shift in the direction of influence from the Southeast to west and northwest, a trend noticeable in the other artifacts as well.

MISCELLANEOUS LITHIC ARTIFACTS

KNIVES

Stemmed Knife, Type 1a (pl. 40, *a*); 2 specimens.

Proportions: Narrow.

Blade: Edges convex.

Shoulders: Prominent.

Stem: Slightly expanding; base convex.

Dimensions: (larger specimen) Length, 108 mm. (4.25 inches); width, 38 mm. (1.50 inches); thickness, 10 mm. (0.39 inch).

Provenience: See table 6.

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[18] The data for the distribution of the types under consideration have been given above under the Remarks section for each specific form.

TABLE 6.—*Provenience of knives, scrapers, choppers, celt, drills, miscellaneous chipped stone, ground stone, and paint pigments*[1]

Type of artifact	Site	Level									Total
		0–15	15–30	30–45	45–60	60–75	75–90	90–105	105–120	Unlocated	
Knives :											
Type 1a	D	------	------	------	------	------	------	------	------	*2	2
Type 1b	K	------	------	1	------	------	------	------	------	------	1
Type 1c	K	------	1	------	------	------	------	------	------	------	1
Type 1d	D	------	------	------	------	1	------	------	------	*7	8
Type 2	D	2	1	4	10	14	9	4	------	*38	82
	K	2	3	2	3	3	------	------	1	------	14
	5	------	------	------	------	------	------	------	------	4	4
Type 3	D	1	2	1	4	3	2	5	------	*28	46
	K	1	1	2	3	------	------	------	------	------	7
Type 4	D	------	1	------	2	------	1	1	------	*3	8
	K	1	1	------	1	2	------	------	------	------	5
Type 5	D	------	1	------	------	2	------	------	------	*3	6
Type 6a	K	1	------	------	------	------	------	------	------	------	1
Type 6b	K	1	------	------	------	------	------	------	------	------	1
Scrapers:											
Stemmed end	D	------	------	------	2	------	------	1	------	*1	4
	G	------	------	------	------	1	------	------	------	------	1
Large end	D	------	1	------	------	------	------	------	------	*1	2
	K	1	------	------	------	------	------	------	------	------	1
Small end	D	2	2	------	------	------	------	------	------	*1	5
	K	------	------	------	1	------	------	1	------	------	2
Large side	D	------	------	------	------	------	------	------	------	*2	2
	K	1	------	1	------	------	------	------	1	------	3
Small side	D	3	3	------	1	1	------	1	------	*1	10
	K	3	2	1	1	1	1	------	------	------	9
	5	------	------	------	------	------	------	------	------	1	1
Flake	D	9	14	22	21	45	37	28	1	*5	182
	K	19	21	19	10	3	------	1	2	2	77
	G	------	------	------	------	------	1	------	------	------	1
Choppers :											
One end unmodified	D	1	------	1	2	1	1	2	------	*9	17
	K	1	------	------	------	2	------	------	------	------	3
Both ends modified	D	------	1	3	1	5	6	4	------	*31	51
	K	------	1	------	------	1	1	------	------	------	3
Celt	D	------	------	------	------	------	------	------	------	*1	1
Drills :											
Type 1a	D	1	------	------	------	------	------	------	------	*1	2
	K	------	2	1	------	------	------	------	------	------	3
Type 1b	K	------	2	------	2	------	------	------	------	------	4
Type 1c	K	2	------	1	1	------	------	------	------	------	4
Type 2a	D	------	------	------	------	------	------	1	------	------	1
	K	------	1	------	------	------	------	------	------	------	1
Type 2b	D	------	------	------	------	1	------	1	------	------	2
	K	------	1	------	------	------	------	------	------	------	1
Type 3	D	------	------	------	------	------	------	------	------	1	1
Miscellaneous :											
Gravers	D	2	------	1	------	2	2	1	------	*2	10
	K	1	1	------	------	------	------	------	------	------	2
	G	------	------	------	------	------	1	------	------	------	1
Eccentric flint	D	------	------	------	------	1	------	------	------	------	1
Ground :											
Atlatl weights	D	------	------	------	------	------	------	------	------	*2	2
Sandstone saws and abraders	D	------	1	------	------	------	------	------	------	------	1
	K	------	------	------	------	------	------	------	------	------	40
Milling stone	A	------	1	------	------	------	------	------	------	------	1
Handstone	A	------	1	------	------	------	------	------	------	------	1
Paint pigments	D	------	------	2	1	5	4	------	------	*1	13
	K	1	------	------	------	------	------	------	------	------	1
	G	1	------	------	------	------	3	------	------	------	4

[1] Symbols: D=Doering site; K=Kobs site; G=Grisbee site; A=Addicks "Mound"; 5=site 42/66A6-5; *=From stream bed collection.

Stemmed Knife, Type 1b (pl. 40, *b*); 1 specimen.

Proportions: Narrow.

Blade: Edges convex.

Shoulders: Obscured by width of base.

Stem: Flaring, formed by wide, deep, lateral notches just above the base; base concave. Short longitudinal flakes thin the base on either face.

Dimensions: Length, 81 mm. (3.18 inches); width, 32 mm. (1.28 inches); thickness, 7 mm. (0.28 inch).

Provenience: See table 6.

Remarks: Knives of this form are not common in the Southeast, but similar forms are illustrated by Claflin (1931, pl. 61) for Stalling's Island, Ga., and by Moore (1902, p. 183, fig. 96) for northwestern Florida.

Stemmed Knife, Type 1c (pl. 40, *c*); 1 specimen.

Proportions: Narrow.

Blade: Edges convex.

Shoulders: Poorly defined.

Stem: Contracting to round base.

Dimensions: Length, 71 mm. (2.79 inches); width, 25 mm. (0.96 inch); thickness, 7 mm. (0.28 inch).

Provenience: See table 6.

Stemmed Knife, Type 1d (pl. 40, *d, e*); 8 specimens.

Proportions: Medium to broad.

Blade: Edges convex with rounding point.

Shoulders: Prominent to slightly barbed.

Stem: Contracting to expanding.

Average dimensions: Length, 35 mm. (1.37 inches); width, 30 mm. (1.18 inches); thickness, 8 mm. (0.31 inch).

Provenience: See table 6.

Remarks: Judging from the variability of this group, it seems likely that some, if not all, of these are reworked from broken projectile points. Like the stemmed scrapers, they have a wide distribution through the Southeast. Some occurrences are: Stalling's Island (Claflin, 1931, pl. 64), Mississippi (Brown, 1926, figs. 40, 41), and Indian Knoll (Webb, Wm. S., 1946, fig. 35, *d*, third row), where Webb calls them choppers.

Leaf-Shaped Knife, Type 2 (pl. 40, *f, g*); 100 specimens.

Proportions: Narrow to medium.

Blade: Convex edges. Shape varies from symmetric to asymmetric.

Base: Convex to round.

Average dimensions: Length, 75 mm. (2.95 inches); width, 23 mm. (0.90 inch); thickness, 9 mm. (0.36 inch). Considerable individual variability range.

Provenience: See table 6.

Remarks: Workmanship varies from crude percussion-chipped blades to carefully made pressure-flaked and retouched ones. These range widely in space and time, and consequently are of little value for tracing areal and temporal relationships.

Triangular Knife, Type 3 (pl. 40, *h, i*); 53 specimens.

Proportions: Medium.

Blade: Edges straight to somewhat convex.

Base: Straight to slightly convex.

Average dimensions: Length, 70 mm. (2.75 inches); width, 28 mm. (1.09 inches); thickness, 10 mm. (0.39 inch).

Provenience: See table 6.

Remarks: As in Type 2 above, workmanship varies considerably. Temporal and areal distribution unknown.

Ovoid Knife, Type 4 (pl. 41, *a. b*); 13 specimens.

Proportions: Medium to broad.

Blade: Circular to ovoid in outline.

Average dimensions: Length, 65 mm. (2.56 inches); width, 47 mm. (1.84 inches); thickness, 9 mm. (0.36 inch).

Provenience: See table 6.

Remarks: Workmanship usually good. Their range in time and space is so wide that they are inherently poor as diagnostics of diffusion.

Long Narrow Knife, Type 5 (pl. 41, *e*) 6 specimens.

Proportions: Narrow.

Blade: Edges roughly parallel. Some are left with thickened center as if to form finger and thumb grip.

Average dimensions: Length, 102 mm. (4.00 inches); width, 23 mm. (0.90 inch); thickness, 13 mm. (0.51 inch) at thickened center.

Provenience: See table 6.

Remarks: This form would have functioned admirably for the opening of shellfish, being, in fact, very similar to the present-day commercial knife used for that purpose. However, few shells were found in the Addicks Basin sites. Distribution in space and time unknown.

Beveled Knife, Type 6a (pl. 41, *c*); 1 specimen (broken).

Proportions: Narrow.

Blade: Edges straight, formed by beveling on opposite faces of the blade.

Base: Convex.

Dimensions: Length, 95 mm. (3.73 inches) estimated; width, 29 mm. (1.14 inches); thickness, 5 mm. (0.20 inch).

Provenience: See table 6.

Remarks: This specialized form of knife and its companion form, Type 6b, have a wide distribution in the Southern Plains region, extending eastward from Pecos Pueblo (Kidder, 1932, pp. 30–34, figs. 13–16) across northern Texas into the historic Caddo area in northeast Texas. Poteet (1938, p. 245), in her distributional survey of the various forms of beveled knives, believes them to be very recent. The most recent data shows them to belong to the late horizons south of the Red River (Krieger, 1946, p. 142). The type occurs in the protohistoric Austin Focus of cental Texas, and where specific data is obtainable for northeast Texas, it appears to be historic (Krieger, 1946, p. 142). On the basis of its occurrence in the Antelope Creek Focus of the Texas Panhandle, where it represents a southern extension of a typically Plains form, it would date not earlier than 1300 A. D. (Krieger, 1946, p. 71) and would be increasingly later as it diffused south and east. The Addicks Basin specimens probably do not date much earlier than 1450 A. D.

Beveled Knife, Type 6b (pl. 41, *d*); 1 specimen.

Proportions: Narrow.

Blade: Diamond-shaped with straight edges. Each pair of parallel edges formed by beveling from same face, and the opposing edges by beveling on opposite face.

Dimensions: Length, 99 mm. (3.89 inches); width, 26 mm. (1.03 inches); thickness, 6 mm. (0.23 inch).

Provenience: See table 6.

Remarks: See remarks section for beveled knife, Type 6a, above.

SCRAPERS

Stemmed End Scrapers (pl. 42, *b, c*); 5 specimens.

Proportions: Medium to broad.

Blade: Convex to round with high angle scraping edge.

Shoulders: Weak to prominent.

Stem: Vary from parallel to widely expanding; base concave to convex.

Average dimensions: Length, 28 mm. (1.09 inches); width, 24 mm. (0.93 inch); thickness, 9 mm. (0.36 inch).

Provenience: See table 6.

Remarks: While these may have been fashioned originally as scrapers, it seems likely that some of them are broken projectile points. Variants of the form are widely distributed throughout the Southeast. They occur in the Archaic of western Tennessee (Lewis and Kneberg, 1947, pl. 4), Stalling's Island, Ga. (Claflin, 1931, pl. 64), Mississippi (Brown, 1926, figs. 39, 42), Hiwassie Island (Lewis and Kneberg, 1946, pl. 65, *d*), Indian Knoll (Webb, Wm. S., 1946, fig. 35, *c*), and western Missouri (Wedel, 1943, pl. 14, l–n).

Large End Scrapers (pl. 42, *a*); 3 specimens.

Proportions: Medium to long.

Blade: Large, planoconvex, with high angle scraping or planing edge at right angle to long axis; taper from convex scraping edge to round or pointed base.

Average dimensions: Length, 65 mm. (2.56 inches); width, 40 mm. (1.59 inches); thickness, 22 mm. (0.87 inch).

Provenience: See table 6.

Remarks: Made from large, selected flakes. Temporal and spatial distribution unknown.

Small End Scrapers (pl. 42, *d, e*); 7 specimens.

Proportions: Medium.

Blade: Convex ended with high angle scraping edge.

Average dimensions: Length, 31 mm. (1.21 inches); width, 35 mm. (1.37 inches); thickness, 12 mm. (0.46 inch).

Provenience: See table 6.

Remarks: Thick random flakes with most of work confined to scraping edge. Temporal and geographical range unknown.

Small Side Scrapers (pl. 42, *f–i*); 20 specimens.

Proportions: Narrow to medium.

Blade: Variable in size and shape, commonly have definitely beveled lateral scraping edges; some are made from prismatic flakes and flaked around entire perimeter.

Average dimensions: Length, 64 mm. (2.51 inches); width, 27 mm. (1.06 inches); thickness, 6 mm. (0.23 inch).

Provenience: See table 6.

Remarks: Made from relatively thin, selected flakes. Time and space range not known.

Flake Scrapers (not illustrated) 260 specimens.

Proportions: Variable.

Blade: Random flakes with localized scraping edges resulting, for the most part, from the shearing action of use rather than any intentional flaking. A few have small concave scraping edges which could have been used for scraping shafts.

Average dimensions: Length, 23 mm. (0.90 inch); width, 18 mm. (0.71 inch); thickness, 4 mm. (0.15 inch).

Provenience: See table 6.

CHOPPERS

Choppers with one end unmodified (pl. 43, *a*, *b*); 20 specimens.

Choppers are small river cobbles or pebbles which have a cutting edge fashioned on one extremity and occasionally along the lateral edges by rough percussion flaking. One or more surfaces remain unworked to serve as a handhold. Some of them resemble the large so-called "fist axes" of the central Texas cultures but are much smaller. They vary considerably in size, but average dimensions are: Length, 70 mm. (2.75 inches); width, 40 mm. (1.59 inches); thickness, 26 mm. (1.03 inches). Provenience: See table 6.

Choppers with both ends modified (pl. 43, *c*, *e*); 54 specimens.

For the most part, these choppers are roughly leaf-shaped or ovoid in outline and percussion-chipped on all edges, but some are small cobbles with both extremities flaked to a chopping edge, leaving the central portion unmodified. Both natural cobbles and large flakes were utilized. Size is quite variable, but average dimensions are: Length, 85 mm. (3.34 inches); width, 42 mm. (1.65 inches); thickness, 21 mm. (0.84 inch). Provenience: See table 6.

Celt (pl. 43, *d*); 1 specimen.

This is a large leaf-shaped piece of good percussion workmanship. Its dimensions are: Length, 137 mm. (5.37 inches); width, 53 mm. (2.09 inches); thickness, 22 mm. (0.87 inch). Provenience: See table 6.

DRILLS

Expanding Base, Type 1a (pl. 44, *a*, *b*); 5 specimens (broken).

Base: Slightly expanding to flaring, well shaped, sometimes ovoid in outline.

Shaft: Nearly round, relatively long.

Average dimensions: Length, indeterminate; width: base, 18 mm. (0.71 inch); shaft, 8 mm. (0.31 inch); thickness, 6 mm. (0.23 inch).

Provenience: See table 6.

Remarks: This drill form is widespread in the United States. Some Southeast occurrences are Hiwassie Island (Lewis and Kneberg, 1946, pls. 65, *d*, and 66, *c*), Missouri (Wedel, 1943, pl. 14, *g*), Indian Knoll (Webb, Wm. S., 1946, fig. 33), sites Lu^{o} 59 and Lu^{v} 92 in the Pickwick Basin (Webb, Wm. S. and DeJarnette, 1942, pls. 159, 2; 257, 1), Western Tennessee Archaic (Lewis and Kneberg, 1947, pl. 5), sites Ct^{v} 17 and Li^{v} 36 in the Wheeler Basin (Webb, Wm. S., 1939, pls. 27 and 77, *b*), and the Crooks site in central Louisiana (Ford and Willey, 1940, fig. 47, *j*).

Expanding Base, Type 1b (pl. 44, *c*, *d*); 4 specimens.

Base: Expanding, unshaped flake, irregular in outline.

Shaft: Tapering, lozenge-shaped or flattish in cross section.

Average dimensions: Length, over-all, 26 mm. (1.03 inch); shaft, 18 mm. (0.71 inch); width, over-all, 19 mm. 0.75 inch); shaft (midpoint), 6 mm. (0.23 inch); thickness, 4 mm. (0.15 inch).

Provenience: See table 6.

Remarks: Similar drill types occur at Stalling's Island (Claflin, 1931, pl. 65), sites Lu^{o} 59 and Lu^{o} 72 in the Pickwick Basin (Webb, Wm. S. and DeJarnette, 1942, pls. 159, 2; 236, 2), site Ct^{v} 17 in the Wheeler Basin (Webb, Wm. S., 1939, pl. 27), and the Harrell site in north-central Texas (Krieger, 1946, fig. 7).

Expanding Base, Type 1c (pl. 44, *e, f*); 4 specimens.

Base: Expanding, unshaped flake, irregular in outline.

Shaft: Short, tapering. One shaft formed by beveling from opposite faces of the flake. Flattened in cross section.

Average dimensions: Length, over-all, 23 mm. (0.90 inch); shaft, 9 mm. (0.36 inch); width, over-all, 18 mm. (0.71 inch); shaft (midpoint), 4 mm. (0.15 inch); thickness, 5 mm. (0.20 inch).

Provenience: See table. 6.

Remarks: While of apparently limited distribution, this type also occurs at site Ma° 46 in the Wheeler Basin (Webb, Wm. S., 1939, pl. 115, *b*).

Stemmed Drill, Type 2a (pl. 44, *j*); 3 specimens.

Stem: Parallel-sided.

Shaft: Short, tapering.

Average dimensions: Length, over-all, 47 mm. (1.84 inches); shaft, 10 mm. (0.39 inch); width, over-all, 17 mm. (0.68 inch); shaft (midpoint), 4 mm. (0.15 inch); thickness, 6 mm. (0.23 inch).

Provenience: See table 6.

Remarks: These specimens are made from, or resemble, projectile points on which short shafts have been flaked on the distal end, and they may have been used as awls rather than drills. They tend to have a southern distribution, occurring at sites Lu° 59, Lu° 67, Lu° 72, and Ct° 27 in the Pickwick Basin (Webb, Wm. S. and DeJarnette, 1942, pls. 159, 2; 227; 236, 2; and 294, 1); site Ct^v 17 in the Wheeler Basin (Webb, Wm. S., 1939, pl. 27), and in the Tchefuncte horizon in southern Louisiana (Ford and Quimby, 1945, fig. 9, *e*).

Stemmed Drill, Type 2b (pl. 44, *g, h*); 3 specimens.

Stem: Short, contracting.

Shaft: Relatively long, flattish in cross section; contracts from flaring shoulders.

Average dimensions: Length, over-all, 32 mm. (1.28 inches); shaft, 20 mm. (0.78 inch); width, over-all, 19 mm. (0.75 inch); shaft (midpoint), 5 mm. (0.20 inch); thickness, 3 mm. (0.12 inch).

Provenience: See table. 6.

Remarks: These drills are apparently modified from projectile points. Drills of similar design, but of different projectile point types, are widespread in the Southeast. They are found at Stalling's Island (Claflin, 1931, pl. 65), Indian Knoll (Webb, Wm. S., 1946, fig. 33), Western Tennessee Archaic (Lewis and Kneberg, 1947, pl. 5), sites Ct^v 17 and Ma° 46 in the Wheeler Basin (Webb, Wm. S., 1939, pls. 27 and 115, *b*), and sites Lu° 59 and Ct° 27 in the Pickwick Basin (Webb, Wm. S. and DeJarnette, 1942, pls. 159, 2; 294, 1).

Double-Ended Drill, Type 3 (pl. 44, *i*); 1 specimen (broken).

Shaft: Nearly cylindrical in cross section, tapering slightly to either end.

Dimensions: Length, indeterminate; width, 11 mm. (0.43 inch); thickness, 8 mm. (0.31 inch).

Provenience: See table 6.

Remarks: This type of drill is found in Missouri (Wedel, 1943, pl. 14, *f*), sites Lu° 59 and Lu° 67 in the Pickwick Basin (Webb, Wm. S. and DeJarnette, 1942, pls. 159, 2; 227), in northern Louisiana (Webb, C. H., 1948, fig. 44, 10), and in the Crooks site, a Marksville period site in central Louisiana (Ford and Willey, 1940, fig. 47, *k*).

MISCELLANEOUS CHIPPED STONE

Gravers (pl. 44, *k–o*); 13 specimens.

For the most part, these are random flakes with one or more short graving points at the extremities or along the lateral edges. One piece is a fragmentary blade with the tip reworked. The graving points vary from 1 mm. to 3 mm. (0.039 inch to 0.12 inch) in length.

Provenience: See table 6.

Remarks: Gravers occur elsewhere in the Southeast, in western Tennessee (Lewis and Kneberg, 1947, pl. 5), Indian Knoll (Webb, Wm. S., 1946, fig. 33), and in the prepottery cultures of northern Louisiana (Webb, C. H., 1948, fig. 44, 12).

Eccentric Flint (pl. 44, *p*); 1 specimen.

Proportions: Narrow.

Blade: Pointed at both ends with deep, regular, squarish serrations completely around the perimeter.

Dimensions: Length, 37 mm. (1.46 inches); width, 14 mm. (0.56 inch); thickness, 3 mm. (0.12 inch); serrations average 1.5 mm. (0.06 inch) deep, 2 mm. (0.08 inch) wide.

Provenience: See table 6.

Remarks: While eccentric chipped stone artifacts occur infrequently in the Southeast, none are of a similar pattern.

GROUND STONE

Atlatl weights (banner stones) (pl. 45, *a*); 2 specimens, broken.

One piece, made from medium-grained, well-polished, reddish sandstone, is of the winged form. It is broken across the tubularly drilled perforation and wing so that the exact shape cannot be determined. The second specimen is represented by two fragments which fit together to form part of a wing. The material is a fine-grained, dark-gray sandstone. Provenience: See table 6.

Remarks: Banner stones, or atlatl weights, as they seem to be in many, if not all, cases, are of wide distribution in the eastern United States. In the Southeast they are found in a wide variety of shapes, such as the prismoidal types of Indian Knoll (Webb, Wm. S., 1946, p. 227 et seq.) and others elsewhere. Weights of the same or similar shapes as the Addicks Basin specimens occur in site Lu° 25, unit 1, in the Pickwick Basin (Webb, Wm. S. and DeJarnette, 1942, pl. 94, 2), Stalling's Island (Claflin, 1931, pl. 45, *f*), and in northeast Texas (Jackson, 1935, p. 27, pl. 5, No. 18).

Sandstone abraders and saws (pl. 45, *b–e*); 41 specimens.

These are made of fine-grained, poorly cemented sandstone. A few are unshaped, but the majority show wear or abrasion facets, and five have been ground or worn to sharp edges which could easily have been used as saws for bone, shell, or wood.

Dimensions: Length ranges from 24 mm. (0.93 inch) to 81 mm. (3.18 inches); width, 14 mm. (0.56 inch) to 65 mm. (2.56 inches); thickness, 12 mm. (0.46 inch) to 35 mm. (1.37 inches).

Provenience: See table 6.

Remarks: Similar sandstone saws occur in the Tchefuncte sites of the Lower Mississippi Valley (Ford and Quimby, 1945, fig. 11).

Milling Stone (pl. 45, *g*); 1 specimen (broken).

This piece is a fragment of a thin sandstone slab milling stone with a basin-shaped depression on either face. Neither shape nor size characteristics can be determined accurately.

Provenience: See table 6.

Remarks: Milling stones and the accompanying handstones do not seem to have been widely used in the Addicks Dam Basin sites.

Handstone (pl. 45, *f*); 1 specimen (broken).

A piece of sandstone, irregular in outline, has a grinding surface on one face. This surface slopes to either edge from a transverse dorsal ridge. While it probably was used as a handstone for the grinding of seeds or grain, it may have been a specialized abrader. Provenience: See table 6.

Hammerstones (not illustrated).

Hammerstones were not numerous in any of the sites but occurred sporadically throughout the deposits. None show any deliberate shaping but are characterized by roughening and abrasion marks resulting from percussion on the striking surface. Usually made from a small river cobble.

MISCELLANEOUS MINERALS

Paint Pigments (pl. 46); 18 specimens.

Eleven pieces are red, six yellow, and one black. The red pigments are both nodular and tabular in form, and with one exception are composed of water-laid sandstone cemented by hematite plus minor elements of limonite (pl. 46). The single exception is of fine-grained, earthy hematite (pl. 46, *a*). This specimen has been reduced to a thick, roughly tabular form by abrasion, the facets and striations of which are still clearly visible. Dimensions of this specimen are: Length, 57 mm. (2.25 inches); width, 53 mm. (2.09 inches); thickness, 27 mm. (1.06 inches).

Five nodular specimens are of sandstone cemented with limonite which imparts a yellow pigmentation. One tabular piece of earthy limonite contains a few jasper particles (pl. 46, *c*).

A lump of black micaceous schist has been abraded into a somewhat cupped shape, perhaps to obtain a low-grade black pigment (pl. 46, *d*). It has a specular appearance imparted by the mineral, muscovite. Provenience: See table 6.

STRATIGRAPHY AND DISCUSSION OF MISCELLANEOUS LITHIC ARTIFACTS

Those miscellaneous artifacts of the lithic complex that may be considered indigenous to the Addicks Dam Basin sites present little evidence of chronological import. A glance at table 6 will show why this is true. For the most part, artifacts whose vertical distribution appears to be limited to upper or to lower levels are represented by so few specimens as to render difficult any precise chronological interpretation. Further, those types of artifacts which are numerically adequate for satisfactory conclusions appear to have a vertical range generally comparable to the total distribution of all artifacts in the site, the maximum number of the particular type falling close to the level from which the majority of all other artifacts are derived. Only types whose chronological position has been secured in other areas seem potentially useful for establishing relative dating.

Of the artifacts classed as knives, only types 2 and 3 were recovered in quantity. Both types have a continuous vertical distribution, are relatively scarce in both upper and lower levels, and are most numerous in the middle levels. None of the type 1 variations (the stemmed knives) or types 4 and 5 are numerous enough to be established as upper or middle and lower level determinants. Only the types 6a and 6b have strong chronological implications. As discussed above, these cannot have been introduced much before 1450 A. D. Since both occurred in the top level of the Kobs site, they may be considered as a tentative time marker for that level.

Flake scrapers are the most numerous variety in this category, and, as in the case of knife types 2 and 3, are continuously distributed vertically with the greatest concentration at about the level from which the majority of all other artifacts in the site were found. None of the other scraper forms were found in significant quantities.

On the basis of stratigraphic concentration, choppers, as a class, seem to be most representative of the middle level. However, this data needs to be augmented, inasmuch as the total number of choppers recovered is inadequate.

The single flaked celt recovered from the stream bed at the Doering site is unplaced stratigraphically.

None of the drill types were recovered in sufficient numbers to be stratigraphically significant. Gravers have a scanty but continuous vertical distribution; and while the single eccentric flint found was recovered from the middle level of the Doering midden, it should not be considered as a chronological diagnostic on the basis of a single find.

Ground stone artifacts are represented by atlatl weights, or banner stones; sandstone saws and abraders; and a single milling stone and a handstone, both fragmentary. Of these, neither of the atlatl weight fragments was found in situ, and hence at present cannot be related to a definite horizon. Sandstone saws and abraders appear stratigraphically late at both the Kobs and the Doering sites. The milling stone and the handstone from the Addicks "Mound" were found in a late context by Black.

Hammerstones occur throughout the middens and do not appear to have chronological significance.

From the standpoint of distribution, the miscellaneous lithic artifacts are of interest chiefly in that they affirm the essentially Southeastern character of the Addicks Basin sites. This picture is not, however, so clear-cut as in the case of ceramic materials or of the projectile points. In certain of the artifact groups structural requirements tend to obviate strong regional variations in pattern. Nevertheless, there are types which seem to be limited to, and characteristic of, the Texas cultures on the one hand, and the Southeast on the other. It is these few traits, together with their chronological implications, that confirm the time and direction of cultural flow.

Small stemmed knives (type 1b) and end scrapers that appear to have been made from broken projectile points, but which may have been manufactured for the purpose, are a common trait in the eastern United States. In the Southeast they range from the Archaic horizon to protohistoric time, but the form seems never to have spread west to the Texas cultural provinces.

On the late time level the intrusion of the beveled knives (types 6a and 6b) correlates with the first appearance of the small arrow points. These are probably trade specimens from the protohistoric and early historic Austin Focus where both forms are typical (Krieger, 1946, p. 142). These re-emphasize the late cultural influences moving eastward out of central and north-central Texas.

The various categories of drills recovered from the Addicks Basin sites represent types which, while all occurring in the Southeast, are by no means limited to that area. The same may be said of gravers, which, ubiquitous in time and space, seem to occur among most groups that placed dependence upon hunting as a primary means of subsistence.

Atlatl weights, or banner stones, occur generally in the Eastern Archaic and appear largely confined to that cultural plane. While the trait itself is widespread, there is a considerable variety of forms, each having its own more or less limited distribution. Winged forms, such as the Doering site specimens, are found at Stalling's Island (Claflin, 1931, pl. 45, *f*), in the Pickwick Basin (Webb, Wm. S. and DeJarnette, 1942, pl. 94, 2), and in northeast Texas (Jackson, 1935, p. 27; pl. 5, No. 18). The Addicks Basin specimens, recovered out of context, cannot be placed in the relative stratigraphy; nevertheless, they point to Southeastern influence at an early time level.

Milling stones and handstones are material traits in cultures both east and west of the Addicks Basin. Because of the fragmentary condition of the specimens recovered from the Addicks "Mound," no inferences can be drawn concerning their possible provenience. They are interesting chiefly because they are the only hint that agriculture may have been practiced in protohistoric times.

BONE, ANTLER, AND SHELL COMPLEX

Artifacts of bone, antler, and shell:	
Bone:	
Cut bone awls	6
Ulna spatula	1
Worked bone fragment	1
Stained bone fragments	4
Total	12

Artifacts of bone, antler, and shell—Continued

Antler:		
Projectile points (socketed)	5	
Bead or handle	1	
Polished tines	4	
Worked antler fragment	1	
Total		11
Shell:		
Pendants		2
Total artifacts		25

BONE

Cut Bone Awls (pl. 47, *b–e*); 6 specimens (fragmentary).

These were cut from long bones and were abraded into shape. Some are polished, either during the process of manufacture or by usage.

Average dimensions: Length, indeterminate; width, 9 mm. (0.36 inch); thickness, 5 mm. (0.20 inch).

Provenience: See table 7.

Ulna Spatula (pl. 47, *a*); 1 specimen.

A deer ulna has the distal end ground down to a roundish spatulate end.

Dimensions: Length, 71 mm. (2.79 inches); width, blade, 12 mm. (0.46 inch); thickness, blade, 4 mm. (0.15 inch).

Provenience: See table 7.

Remarks: These have a wide distribution in the Southeast, in time as well as space. They occur at Stalling's Island (Claflin, 1931, pl. 40, *d*), site No. 19 in the Norris Basin (Webb, Wm. S., 1938, pl. 119, *b*), in the Archaic of western Tennessee (Lewis and Kneberg, 1947, pl. 10), the Dallas Focus at Hiwassie Island (Lewis and Kneberg, 1946, pl. 79, *c*), Indian Knoll (Webb, Wm. S., 1946, fig. 45, *c*), sites Lu° 67 and Ct° 27 in the Pickwick Basin (Webb, Wm. S. and DeJarnette, 1942, pls. 225, 1; 288, 1), and in the Tchefuncte horizon (Ford and Quimby, 1945, fig. 13, *h*, *i*).

Cut Bone (not illustrated); 1 specimen.

The cannon bone of a deer has been deeply grooved along the longitudinal axis of both sides as if for splitting the bone into halves.

Provenience: See table 7.

Stained Bone (not illustrated); 4 specimens.

Three fragments of turtle carapace and a small piece of long bone are stained a turquoise color. It is impossible to determine whether this staining was intentional, but it seems unlikely. Since all four pieces were close together in the midden, it is assumed that the same process resulted in the accidental coloration of the bones. Spectrographic analysis shows the following metallic constituents:

Primary element (bone former): Calcium.
Minor elements in appreciable concentrations: Manganese, strontium.
Trace elements: Copper, aluminum, magnesium, silicon, iron.

Whether the trace of copper is sufficient to have caused the staining is not clear. In any event, since none of the other elements present normally give rise to stains of turquoise hue, and since no metallic copper was recovered from the site, the question remains an open one.

Provenience: See table 7.

TABLE 7.—*Provenience of bone, antler, and shell artifacts* [1]

Type of artifact	Site	Level									Total
		0–15	15–30	30–45	45–60	60–75	75–90	90–105	105–120	Unlocated	
Bone:											
Cut bone awls	D	1							1		2
	K				1	1					2
	A		1								1
	4					1					1
Ulna spatula	D					1					1
Cut bone	D					1					1
Stained bone	K				4						4
Antler:											
Projectile points	D					2		2	1		5
Bead (?)	K			1							1
Worked antler tines	D			1		1					2
	K				1	1					2
Cut antler	D				1						1
Shell pendants	K			2							2

[1] Symbols: D=Doering; K=Kobs; A=Addicks "Mound"; 4=42/66A6-4.

ANTLER

Projectile Points (pl. 47, *h, i*); 5 specimens.

These are socketed for hafting, presumably for use as projectile points. Two are pointed, one intentionally blunted, perhaps for a bird bunt, and the remaining two are broken.

Average dimensions: Length, 50 mm. (1.96 inches); diameter, 13 mm. (0.51 inch); diameter of sockets, 5 mm. (0.20 inch).

Provenience: See table 7.

Remarks: Antler projectile points are widely distributed throughout the Southeast, both geographically and temporally. They occur at Stalling's Island, Ga. (Claflin, 1931, pl. 41, *d, e*; Fairbanks, 1942, fig. 23, *a*), Peachtree Mound (Setzler and Jennings, 1941, pl. 13), in the Archaic horizon of western Tennessee (Lewis and Kneberg, 1947, pl. 13), Indian Knoll (Webb, Wm. S., 1946, fig. 47, *d*), Missouri (Wedel, 1943, pl. 9), Hiwassie Island in both the Hiwassie Island and Dallas components (Lewis and Kneberg, 1946, pls. 76, *d*, and 79, *a*), site Ct^{v} 17 in the Wheeler Basin (Webb, Wm. S., 1939, pl. 29), and sites Lu^{o} 25, units 1 and 2, Lu^{o} 59, Lu^{o} 67, and Lu^{o} 72 in the Pickwick Basin (Webb, Wm. S. and DeJarnette, 1942, pls. 97; 120, 2; 147, 1; 226, 1; and 236, 1), and in the Tchefuncte sites of southern Louisiana (Ford and Quimby, 1945, fig. 12).

Bead (?) (pl. 47, *j*); 1 specimen (broken).

This is a section of antler perforated longitudinally so that it may have been strung as a bead, or it may have served as a haft. One end is broken so that the exact nature of the artifact cannot be determined.

Dimensions: Length (present), 34 mm. (1.34 inches); diameter, 20 mm. (0.78 inch); diameter of perforation, 6 mm. (0.23 inch).

Provenience: See table 7.

Worked Antler Tines (pl. 47, *f, g*); 4 specimens.

These sections have been blunted and are polished from use, perhaps as drifts.

Provenience: See table 7.

Cut Antler (not illustrated); 1 specimen.

This antler basal section shows several marks as a result of cutting, but no definite shaping for use.

Provenience: See table 7.

SHELL

Pendants (?) (pl. 47, *k, l*); 2 specimens.

Two small bivalve shells have been ground to an ovate shape. A part of the hinge spire has been left, perhaps to form a means of attachment. From adjacent squares in the Kobs midden, they probably constitute a set of matched pendants or possibly ear ornaments.

Dimensions: Length, 25 mm. (0.96 inch); width, 13 mm. (0.51 inch).

Provenience: See table 7.

STRATIGRAPHY AND DISCUSSION OF BONE, ANTLER, AND SHELL ARTIFACTS

The yield of bone, antler, and shell artifacts from the Addicks Basin sites was small. Cut bone awls, although rare, appear in both the lowest and the uppermost levels of the Doering site, in the Kobs midden, site 42/66A6–4, and the Addicks "Mound." The ulna spatula, from level 60–75 of the Doering midden, appears as a middle level artifact, but because of its single occurrence it does not have particular chronologic significance. Cut bone, as such, has neither typological nor temporal value; and since the stained bones from the Kobs site seem to be the result of accidental coloration, their occurrence does not constitute a recognizable trait.

Of the antler artifacts, only the projectile points obtrude themselves as time markers, and these are confined to the middle and lower levels of the Doering site.

Shell work, appearing only in level 30–45 of the Kobs site, was limited to two artifacts which apparently form a set.

If the bone, antler, and shell artifacts of the Addicks Basin are not of marked chronological significance, two forms are of interest distributionally. Both ulna spatulae and antler projectile points were used over a span of time beginning in the Eastern Archaic (Lewis and Kneberg, 1947, p. 27) and continuing into the historic period (Lewis and Kneberg, 1946, pp. 125–126). Their diagnostic value lies in the fact that they are confined, as material culture traits, to the eastern United States generally, and are conspicuous in the Southeast. Since both are localized in the Middle and Lower levels of the Doering site, they are indicative of the generalized Southeastern cultural tradition of the earlier occupation of the Addick Basin sites.

None of the other traits of bone or antler are stylistically distinctive and so do not lend themselves to distributional analysis. The single form of shell artifact appears to be a type unique to the Kobs site. Whether it proves later to be a consistent trait, it does not contribute, at present, to an understanding of extra-areal influences upon the peoples of the Addicks Dam Basin.

SUBSISTENCE

The subsistence of the Addicks Basin peoples was predicated upon hunting, gathering, fishing, and the collecting of shellfish, probably in the order given. The evidence for these activities is of different orders. The interpolation of gathering as a significant part of the economy is based primarily upon ethnohistorical evidence, and secondarily upon the assumption that any group of people having at their disposal wild vegetal foods would rely on them to some extent, regardless of primary dependence upon hunting or fishing. The ethnohistorical evidence for gathering, if we are justified in projecting backward in time the scanty data of De Vaca, De Bellisle, and the later Spaniards, points to the usage of such plants as "wild potatoes," and almost certainly others were collected to supplement the diet of flesh attested to by archeological evidence. There is, however, little empirical evidence from the sites themselves. Black's record of a concentration of what may have been seeds, or alternatively, wooden beads, with Burial 1, at the Addicks "Mound" constitutes the only possible evidence of vegetal food as such. Likewise, his recovery of fragmentary milling utensils from the late levels of the same site may be interpreted as inferential evidence of gathering. On the other hand, these may have been used for the grinding of corn; but since agriculture was not mentioned for the area until 1745 (Bolton, 1915, p. 330), and De Bellisle (Folmer, 1940, pp. 216–217), in 1721, was explicit in his statements that the Akokisa had no fields, it seems most likely that they were used for seed grinding.

The evidence for hunting and fishing rests on both ethnohistorical and archeological bases. Deer, bear, and bison were hunted, and shellfish were gathered by the historical occupants of the area. Prehistorically, deer, bison, tortoise, and in the early period, antelope, were hunted. Some fishing was done, but the gathering of shellfish seems to have been a rather localized subsistence item.

Table 8 shows the distribution of the various species of mammals, amphibians, fish, and shellfish as they were recovered by site and level. While this probably does not complete the inventory of animals actually taken, it is likely that it reflects the kinds available, and perhaps the preferred forms, as well.

TABLE 8.—*Distribution by level of animal species in the Doering (D) and Kobs (K) sites and site 42/66A6–4 (4)*

Animal species	Site		
	D	K	4
LEVEL 0–15			
Bison (*Bison*)	1	3	1
Deer (*Odocoileus*)	2	2	1
Opossum (*Didelphis*)	------	1	------
Tortoise (*Terrapene*)	------	------	1
LEVEL 15–30			
Bison (*Bison*)	------	1	------
Deer (*Odocoileus*)	2	3	1
Tortoise (*Terrapene*)	1	1	------
Rabbit (cf. *Lepus*)	------	1	------
Bird (unidentifiable)	1	------	------
LEVEL 30–45			
Bison (*Bison*)	1	------	------
Deer (*Odocoileus*)	5	3	1
Tortoise (*Terrapene*)	4	2	1
Large animal (*Bison?*)	1	------	------
Canid	1	------	------
Raccoon (*Procyon*)	1	------	------
Badger (*Taxidea*)	------	1	------
Bird (unidentifiable)	------	1	------
LEVEL 45–60			
Bison or *Bos*	1	------	------
Deer (*Odocoileus*)	8	6	1
Tortoise (*Terrapene*)	3	1	1
Dog (*Canis*)	1	------	------
Badger (*Taxidea*)	1	------	------
Opossum (*Didelphis*)	1	------	------
Rabbit (*Sylvalagus*)	------	[1]x	------
Horse (*Equus cf. complicatus*)[2]	1	------	------
Bird (unidentifiable)	1	------	------
Gar (*Lepidosteus*)	1	------	------
Snail (*Viviparus intertextus* (Say))	------	------	1
Snail (*Heliosonia trivolvis* (Say))	------	------	1
Clam (*Quadrula speciosa* (Lea))	------	------	1
Clam (*Glebula rotundata* (Lamark))	------	------	1
Clam (*Carunculina texasensis* (Say))	------	------	1
LEVEL 60–75			
Bison or *Bos*	1	------	------
Deer (*Odocoileus*)	9	2	1
Tortoise (*Terrapene*)	5	2	1
Badger (*Taxidea*)	1	------	------
Antelope (*Antilocapra*)	1	------	------
Alligator	------	1	------
Mink (*Mustela*)	------	------	1
Snail (*Viviparus intertextus*) (Say))	------	------	1
Clam (*Carunculina texasensis* (Lea))	------	------	1
Clam (*Uniomerus tetralasmus* (Say))	------	------	1
LEVEL 75–90			
Deer (*Odocoileus*)	7	1	1
Raccoon (*Procyon*)	1	------	------
Tortoise (*Terrapene*)	11	------	1
Antelope (*Antilocapra*)	1	------	------
Badger (*Taxidea*)	1	------	------
Clam (*Quadrula speciosa* (Say))	------	------	1

TABLE 8.—*Distribution by level of animal species in the Doering (D) and Kobs (K) sites and site 42/66A6-4 (4)*—Continued

Animal species	Site		
	D	K	4
LEVEL 90–105			
Deer (*Odocoileus*)	6	1	------
Tortoise (*Terrapene*)	14	------	------
Antelope (*Antilocapra*)	1	------	------
Badger (*Taxidea*)	1	------	------
Small canid or raccoon	1	------	------
Fossil bone (unidentifiable)	1	------	------
Bison (*Bison*)	------	1	------
LEVEL 105–120			
Deer (*Odocoileus*)	1	------	------
Antelope (*Antilocapra*)	1	------	------
Tortoise (*Terrapene*)	5	------	------

[1] The letter "x" indicates the presence of the form when the number of individuals is not known.
[2] The preservation of this specimen is different from that of the other material. It was probably found by the Indians and brought into camp.

ANIMAL BONE REFUSE

Animal bone refuse was plentiful in the Doering midden. There were comparatively few bones in level 0–15, and only a small number more in level 15–30. From level 30–45, where there was a notable increase in quantity, the volume of bone refuse per cubic meter increased by level until the maximum concentration was obtained at levels 75–90 and 90–105. Below this there was a decrease in volume, in part explained by the fact that part of the level falls into the sterile clay.

There was less bone refuse in the Kobs site than in the Doering site, and most of it was concentrated in the midden zone from level 15–30 through level 60–75. Although there was some bone in the sand knoll, there was much less volume than in the overlying midden.

Site 42/66A6-4 yielded some animal bone, and also showed some consistent use of shellfish which abounded in the creek below. The evidence was limited by the smallness of the sample from only one test pit.

At none of the other sites was sufficient evidence gathered for analysis of animal-bone content, but it is interesting to note that Black reported a considerable quantity of shell from the Addicks "Mound."

Throughout the occupation of the Addicks Basin sites the deer was the most consistently used food animal, at least 64 individuals being represented. Since all bones of the skeleton are represented, it may be assumed that the bodies were carried intact, or nearly so, to the camp. The relative scarcity of artifacts made from bone or antler shows the essentially food character of utilization, a factor which applies to all other animals as well.

Among the larger mammals, the bison follows the deer in frequency of representation. There were 10 individuals and occurrence was confined to the middle and upper levels. Whether this fact is of ecological significance cannot be answered at present. In any event, the taking of bison seems to have been on the increase toward the end of occupancy of the Kobs site. The acquisition of the horse, noted by De Bellisle in 1719, could have been a factor conducive to greater dependence upon this prime supplier of the plains.

Antelope, represented by four individuals and confined to the lower, or perhaps the lower and early middle levels, raise again the question of possible ecological shifts from the early to the later periods. Because it is impossible to answer this problem at present, the investigation of this and related problems must be one of the goals of future work in the area.

Of the smaller animals, the tortoise was most important, no fewer than 54 individuals having been collected in the various sites. They occurred in the greatest abundance in the lower level, and decreasingly through the middle and upper levels. It is not known whether this decrease was the result of gradual depletion of the local supply, or due, perhaps, to accidents of preservation, or to greater reliance on other fauna.

Animals of less frequent occurrence are the badger (5), raccoon (2, or perhaps 3), opossum (2), and rabbit (2). Mink and alligator are represented by a single individual each. Birds were little used; three occurrences, none of which are identifiable as to species, comprise the total number in this order.

Only a single occurrence of fish may be noted, a gar having been recovered from the middle level of the Doering site. Shellfish also had a restricted distribution. The only site tested or excavated by the survey to show any consistent usage of this item was site 42/66A6–4. As mentioned above, Black reported a considerable quantity of shell from the Addicks "Mound."

The occupants of the Doering site had the dog at least by middle level times. One canid specimen came from the lower levels of the Doering site, and two others of uncertain identity probably represent this species.

The general scarcity of fish and rodent material in the collection is notable, although this may be accounted for by accidents of preservation. However, the preservation of many small splinters of other animal bones makes this unlikely.

Fragmentary human bones scattered throughout the midden raise the question of whether cannibalism was practiced. Their relative scarcity, together with the possibility that they may have come from disturbed burials must, however, be considered as negative evidence.

On the whole, cannibalism cannot have been economically important, and probably was not practiced.

SUMMARY AND CONCLUSIONS

The survey of the Addicks Dam Basin, together with its outlet channel and related works, resulted in the discovery and recording of eight previously unknown sites. Further information about a ninth, the Addicks "Mound," which was destroyed several years ago, was abstracted from the field notes of Marshall Black, of Houston. While there undoubtedly remain some additional sites within the basin, and many more along other stream courses in the general area, the basic culture patterns of the prehistoric inhabitants may be inferred from the results of work done by the survey.

Of the nine sites noted, four have yielded most of the data. Two of the nine sites had been destroyed by construction work; one by the channel rectification of Buffalo Bayou, from which we have Black's data; and the second by erection of the Addicks Dam embankment. Two others proved to be scattered, sparse accumulation of habitation debris; and the remaining five were midden deposits of varying extent and thickness. While the survey was refused permission to test one of the middens, stratigraphic tests were made in site 42/66A6–4 and in the Grisbee site. The main corpus of information, however, derives from the more extensive excavations carried out in the Doering and Kobs sites.

Before passing on to the conclusions, we may briefly review some of the more significant data.

All of the sites, none of which is very extensive, are situated atop sand or clay knolls that originally formed segments of discontinuous natural levees bordering the stream channels of the area. Most of them are midden deposits.

No structural features were found in any of the deposits. If houses had been present, they were of such perishable materials as to have left no traces in the middens. They could, of course, have been built away from the midden itself, but if so, there remain no surface indications of them. Furthermore, there were no definite fireplaces or pits encountered, and a single bed of charcoal was the only objective evidence that fires were built on the middens, although it is probable that much of the discoloration of the deposits was due to carbonized vegetal materials.

Seven burials were recovered, one of which can be tentatively correlated with the middle or lower level of occupation. This much-disturbed burial was semiflexed on the right side, oriented to the east, and there was no burial furniture. The remaining six burials belong to the late or upper level. Five of these were flexed and one semiflexed. Three were lying on the back, two on the left side, the other on the right side. There was no apparent preferred orientation, and while oval burial pits were probably used in all inhumations, they could be defined in only three. As in the lower or middle level burial, there was no definite association of grave goods.

The indigenous pottery of the Addicks Basin consists of a highly variable ware, termed Goose Creek Plain, and its cognate decorated form, Goose Creek Incised. The pottery of this area is primarily sand-tempered, but sherd and calcium phosphate aplastics appear late in the stratigraphic sequence. Both may be intrusive. Color ranges from bright orange through browns to gray. Fire clouding is common, and interiors are sometimes intentionally blackened. Application of a red film appears to be a minor trait. Four vessel shapes may be noted, falling into two main groups. These are basically elongate jars with conoidal or truncated conoidal bases, and deep, wide-mouth bowls of simple contour. Decoration, when present, consists of lip notching, incised lines parallel to the rim of the vessel, pendant triangles, ladderlike elements, hatching, and occasionally punctation used either singly or in combination with the above elements. Tchefuncte Stamped ware, intrusive into the middle level occupation, is of considerable chronological import, while a second intrusive ware of the upper level cannot be identified with any known source. The probability that pottery is absent from the lower level of occupation is likewise important chronologically.

Because of the homogeneity of the local pottery wares, the stratigraphy of projectile points on a percentage basis is the best criterion of relative chronology. Three main groups have been distinguished. The first of these is a composite group of parallel-sided or expanding-stemmed dart points which dominate in the lower level. These are replaced by the second group, comprised of a single variable type with considerable range in size and finish, and termed Gary Stemmed points. These form the bulk of the projectiles recovered from the middle level. The upper level is characterized by small arrow points of several types which rapidly and almost completely supplant the Gary Stemmed points of the middle level. It is important to note that the lower and middle level points seem to be primarily of Southeastern derivation while those of the upper level were introduced from the west and northwest in relatively recent times.

A considerable variety of miscellaneous artifacts was found, and while many of them are so widely spread in space and time as to be of little chronologic or distributional value, certain forms are of some significance in these respects. Small stemmed knives, apparently reclaimed from broken projectile points, and similarly produced scrapers are Southeastern traits, while two forms of beveled knives from the upper level occupation confirm late influence or trade from the west. None of the remaining knife or scraper forms appear to have more than minor value in terms of dating or extra-areal influence.

Drills, choppers, and gravers occurred in all levels and hence cannot be considered as time markers for any one of them. While of little temporal import, the drills, particularly, tend to confirm the general Southeastern pattern of the lithic complex of the Addicks Basin sites.

None of the ground stone artifacts are chronologically secure. Two fragmentary atlatl weights, or banner stones, recovered out of context, nevertheless infer early Southeastern influence. The milling stone and the handstone, both from the Addicks "Mound," are late indicators of gathering or perhaps of agriculture; but these cannot be placed in a distributional framework.

Antler projectile points and an ulna spatula again point to the Southeast as the probable original source of the Addicks Basin culture pattern.

Hunting was the primary subsistence activity of these peoples, but while the evidence is scanty, gathering must have played a considerable part. Collecting of shellfish was localized in the Addicks "Mound" and site 42/66A6–4, even though clams abound in the streams today. Whether use or nonuse of shellfish has cultural or chronologic significance cannot be determined until one of the sites where they formed an important subsistence element is excavated. The question of an ecological shift is obtruded by the occurrence of the antelope, limited to the lower level occupation of the Doering site.

Turning now to the conclusions to be drawn from the foregoing report, it may be noted that description has been in terms of three levels or periods of occupation. There are, besides these, certain suggestions of earlier occupancy. These are by no means clear or definite. The evidence is limited to the occurrence of projectile points usually considered to represent the Paleo-Indian hunters of the high Plains. A single fragmentary Clovis Fluted (?) point and a Scottsbluff (?) (Provisional Type 15) point were found in level 90–105 of the Doering site. A Plainview point was salvaged from the stream bed without context, and two points very similar to the Nebo Hill (Provisional Type 16) points came from the sand knoll beneath the Kobs site. There is nothing inherent in the nature of the finds to indicate any considerable antiquity. Therefore, it cannot be stated whether these should be considered as fossil points picked up and reused by the later inhabitants, or if they actually are a minor component of the early Southeastern cultures. Future excavations will probably solve this intriguing problem, but little import may be assumed at the present time for the occurrence of these points.

The division of the midden deposits of the Addicks Dam Basin into three occupation levels or periods is admittedly an arbitrary device, designed to facilitate the formulation of a relative chronology for the various sites of the region. Each of the levels evolved from the immediately preceding one, for there is an essential homogeneity in the culture pattern, marked by a continuity in the sequence of artifact types and in the structure of the middens themselves. The division into levels rests upon the introduction of new elements into the continuum, elements which once absorbed became strongly characteristic of the level into which they were introduced and of the succeeding levels. Thus, the addition of pottery marks the boundary between middle and lower level, and the acquisition of small arrow points of new types delimits the upper from the middle level. Moreover, these novel elements represent influence and contacts from differing directions, for the pottery is Southeastern in character, while the upper level projectile points and correlated artifacts found their way into the Addicks Basin from the west and northwest.

We may now define the general nature of each of these levels. The lower level occupation was confined to the Doering site, levels 75–90 to 105–120. It is the least secure of the three periods, and is characterized chiefly by the lack of pottery. Projectile points of Provisional Types 14, 17, and 20 are limited to this horizon, as are, probably, Provisional Types 27 and 28. Intrusive points of this level are the Clovis Fluted (?); Pedernales Indented Base, which had a long time span in central Texas; Provisional Type 15 (Scottsbluff (?)); and probably the Plainview Point. The atlatl weight, or banner stone, probably belongs to this period, since it is primarily characteristic of the nonpottery horizons of the eastern United States, but it cannot be definitely placed. Nothing can be said of the burial customs, inasmuch as no skeletal material was recovered from this horizon.

With the inception of pottery-making comes the transition from lower to middle level. To this period belong levels 60–75 to 30–45 in the Doering site; the sand knoll, levels 60–75 to 105–120 in the Kobs site; and perhaps the lower levels of the Grisbee site and site 42/66A6–4. The most striking feature of the projectile point complex of the middle horizon is the almost complete dominance of the Gary Stemmed points which, however, was shared with both lower and upper levels. Provisional Types 16 (Nebo Hill (?)), 24, and probably 29, appear confined to this period, and the single Copena point, found without context, was probably intrusive during the phase. The single ulna spatula and the unique eccentric flint occurred in this level but do not constitute strong traits. Antler projectile points are shared by middle and lower levels, as are Provisional Types 12, 18, 19, 21, and perhaps 25, 26, 30, 31, 32, and the Baird Beveled points, although the latter group was found without context and therefore may not be accurately placed. Knife Type 1d was probably also shared. The only burial recovered from this period was the much-disturbed Burial 1 of the Doering site. It was semiflexed on the right side and was oriented to the east. It does not, however, constitute a strong trait.

The upper level of occupation is the most secure of the three cultural periods and was found at all sites in the Basin. It begins with the introduction of the arrow points Perdiz Pointed Stem, Scallhorn and Eddy Stemmed, Alba Barbed, and Kobs Triangular, as well as Provisional Types 1, 2, 3, and 4. Knife Types 6a and 6b belong to this horizon and offer strong chronological implications. Large end scrapers and Drill Types 1a, 1b, and 1c were here confined to this period. Sandstone saws and abraders from the Kobs and Doering sites, and the milling and handstones from the Addicks "Mound" are, on the basis of our evidence, upper level traits. The unique examples of shellwork are likewise confined to the late period. The ceramic complex, begun in the middle period, continues with little change through the upper level. The only notable difference is found in the tempering. Sherd (?) and calcium phosphate temper appear, but whether they represent indigenous or intrusive wares is not clear. In any event, they are but a minor element in the complex. Figurines may also be characteristic of the phase. The burial complex of the upper horizon is represented by six inhumations; one semiflexed, the other five flexed. There seems to have been no preferred placement or orientation, since burials on the right and left sides and on the back occur, with heads oriented in all directions. No burial furniture was definitely associated with any of the burials, and so may be tentatively considered a negative trait.

The upper level shares a number of traits with the middle level. These are the ceramic complex, Knife Type 5, small end and large side scrapers, the use of hematite and limonite pigments, and perhaps the projectile points of Provisional Types 5, 10, and 13, and Wells Contracting Stem. In the burial complex, inhumation in ovoid pits dug into the sand knoll or midden debris was probably shared, although the information on this point is obscure because of the homogeneous nature of the midden deposit.

The essential continuum of the various phases is further brought out by a number of traits shared by all three levels. The basic consideration of choice of living sites, as well as the midden nature of the sites, are common factors. Certain projectile types occur, or probably occur, in all levels. These are the Gary Stemmed point which, although particularly characteristic of the middle level, nonetheless occurs throughout. Provisional Type 22 likewise has a complete vertical range, and it is probable that Provisional Types 6, 7, 8, 9, 11, and 23 have a similar range. Knives of the types 2, 3, and 4; flake and small side scrapers; both forms of choppers; gravers; hammerstones; and drill forms 2a, 2b, and perhaps 3, all appear to have continuous vertical distribution in the Addicks Basin. Of bone artifacts, only the awl seems to have been shared by upper, middle, and lower levels, but the general paucity of bone artifacts may have a distorting influence on this picture.

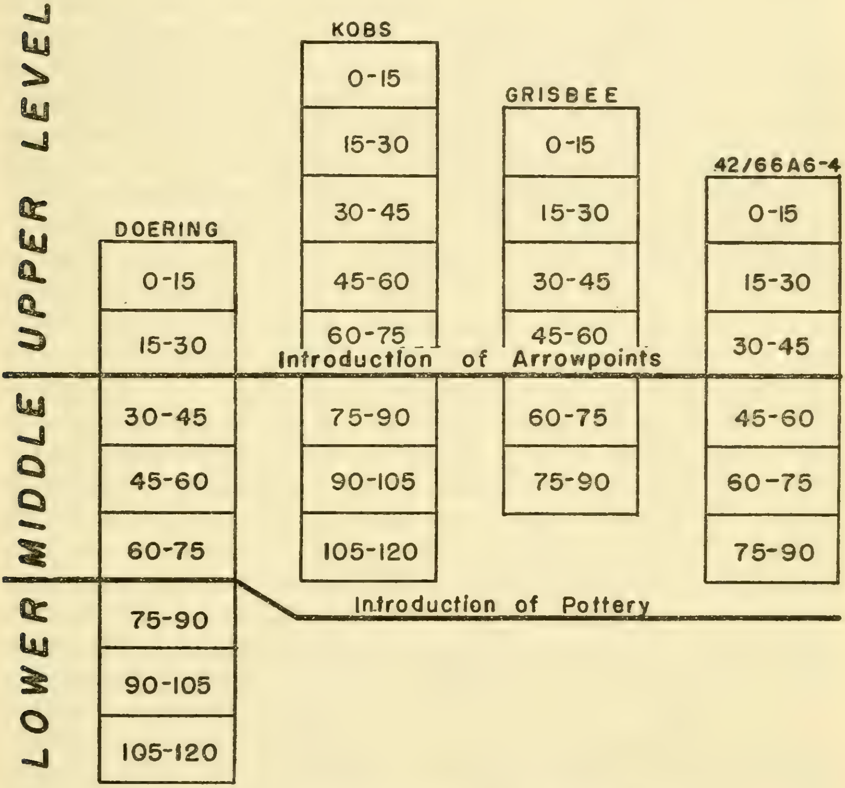
UPPER LEVEL
MIDDLE
LOWER
DOERING
0-15
15-30
30-45
45-60
60-75
75-90
90-105
105-120
KOBS
0-15
15-30
30-45
45-60
60-75
75-90
90-105
105-120
GRISBEE
0-15
15-30
30-45
45-60
60-75
75-90
42/66A6-4
0-15
15-30
30-45
45-60
60-75
75-90
Introduction of Arrowpoints
Introduction of Pottery

FIGURE 23.—Relative chronology of the Addicks Basin sites.

By utilizing the diagnostics established above for the delineation of the three periods, it is possible to correlate tentatively the various sites of the Addicks Dam Basin (fig. 23). Thus, it may be seen that the Doering site alone has a component of the lower period, comprising levels 75–90 to the base of the midden. Although it cannot be included here because of the lack of precise stratigraphic data, it is probable that the Addicks "Mound" also contained the lower level. The middle phase is present at all sites, but this period must have been brief at the Grisbee site and somewhat less so at site 42/66A6-4, judging from the thickness of the strata containing the middle-level material. The upper-level period, like the middle level of occupation, is present at all sites. Level 15–30 of the Doering site would equate with level 60–75 of the Kobs site, 45–60 of the Grisbee site, and 30–45 of site 42/66A6-4. It would seem, on the basis of projectile point percentages, that only the early part of the upper horizon is present at the Doering site and that all the other sites continued to be occupied after its abandonment.

Having set up a relative chronology, we may now attempt to determine its temporal placement in relation to neighboring cultures. There are two factors occurring in the Addicks Basin sites which have potential chronological significance. These are, first, the intrusive Tchefuncte Stamped ware in the middle-level period, and second, the time horizon of the introduction of the small arrow points and the beveled knives. If the date of A. D. 500 to 900, suggested for Tchefuncte (Martin, Quimby, and Collier, 1947, p. 401), be accepted as essentially accurate, then the middle period of the Addicks Basin would fall somewhere in this time span.[19] Since pottery was already an important part of the culture at the time of the Tchefuncte intrusion, it seems likely that the beginning of the middle period would date near the earlier terminus, perhaps A. D. 600 to 700. This would allow some time for the peripheral lag in the introduction of new traits. The earliest date for the upper level would depend upon the dating accorded the Alba Barbed, Perdiz Pointed Stem, and related points. These types have been dated at circa A. D. 1450–1500 (Krieger, 1946, p. 211; Kelley, 1947 a, p. 127), and we may tentatively accept this general time horizon as the beginning of the upper level occupation. The final date for the abandonment of the Kobs site may well be about A. D. 1600. This date would depend on the placement of the beveled knives. As previously explained, these are components of the protohistoric and historic Austin Focus (Krieger, 1946, pp. 165–168). Furthermore, nearly all the beveled knives from eastern and northeastern Texas, where the circumstances are known, are postcontact (Krieger, 1946, p. 142). Since none of the sites in the Addicks Basin showed European contact, it may be assumed that they were abandoned prior to any strong influence from the Spanish or French, if they are not, indeed, entirely prehistoric. Because there was considerable traffic by the Spanish and French in the area during the latter half of the seventeenth century, it seems most logical to place the terminus of the Kobs site occupation at somewhere near A. D. 1600.

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[19] Compare radiocarbon dates published by Arnold and Libby, 1951.

As for the date of the lower-level occupation, little may be said beyond the probability that it antedated the middle period by perhaps a century or so. The problem of ecological changes would have a direct bearing on this date, and it may well offer a new approach to the dating in the future.

It is difficult to comprehend the small size of the sites when confronted by the probable time span involved. This is particularly true of the Doering site, where only 1.20 m. of refuse seems to encompass a thousand years of human history. Nevertheless, it is difficult to escape the conclusion that it does, and one is forced to look for an explanation. It is, of course, entirely possible that the dating of the Tchefuncte horizon is too low and that of the Austin Focus too high. It is equally possible that the Tchefuncte ware recovered from the Kobs midden had been kept in the nature of an heirloom, finally to be left long after the date of its manufacture. Perhaps the most plausible explanation is that the site was occupied by a small group of people more or less continuously, or seasonally, over the entire span of time. Certainly the site is too small to have served a large community for more than a short period.

None of the other sites covered so long a span of time. The Kobs site seems to have been inhabited intermittently during the aggradation of the sand knoll forming the base of the later midden. This occupation dates to middle-level times. Whether the site was left unoccupied for a period of time and then reoccupied by upper-level peoples, or whether the aggradation of the sand knoll was slow enough to span the time from circa A. D. 900 to about A. D. 1500, cannot be answered by physical stratigraphy; but with the beginning of the definite midden deposit, the occupation was by upper-level peoples, as attested to by the lithic complex. Both the Grisbee site and site 42/66A6–4 appear to have been occupied chiefly during upper-level time, but little may be said of them because their excavation was limited to testing operations.

A comparison may now be made between the prehistoric occupants of the Addicks Basin sites and the historic inhabitants to determine the nature and extent of their relationship. Swanton (1928, pp. 712–713) characterizes the Attakapa as a loosely organized group of low culture who practiced cannibalism and who were definitely marginal to the Southeast proper. This would presumably hold, also, for the Akokisa, the westernmost group of the Attakapa. The Akokisa followed a simple annual economic cycle, passing the winter in permanent or semipermanent camps, and the summer in wandering to the seacoast and elsewhere. They followed a hunting and gathering subsistence pattern, including the collecting of shellfish. They had pottery, but whether they made it or received it in trade is not clear. Swanton (1946, p. 737) states that they received most of it from the Karankawa, the Avoyel, and probably the Caddo. Trade was also carried on with the peoples of the interior.

In general, the pattern described for the Akokisa might fit the prehistoric pattern as well. However, there are certain discrepancies which may be examined briefly. There is obviously no means of judging whether social or tribal organization was loose, and the determination of a low or high culture is a relative one. That cannibalism was widely practiced by the prehistoric inhabitants may be questioned so far as the evidence in the excavated sites is concerned. Furthermore, the pottery of the prehistoric sites is much too uniform to have been imported from a variety of sources. It does not conform to the pottery known from the Karankawa nor from the Caddo. On the other hand, it seems likely that the economic cycle described for the historic peoples of the area was much the same as that of the prehistoric. Whatever form of shelter was made and used by the precontact inhabitants must have been perishable, and this may be generally equated with the house types of the historic peoples. Further, there is archeological evidence to support the story of trade with the peoples of the interior. But the majority of the cultural factors which agree are factors which might be attributed to an environmental basis. Therefore, it is impossible at present to derive a satisfactory answer. One solution to the problem lies in the excavation of known Akokisa sites such as the site of the Mission Nuestra Señora de la Luz.

It is likewise impossible to fit the Addicks Basin sites into the Attakpan Phase of Sayles (Sayles, 1935, p. 41), inasmuch as there are insufficient details given for a comparison. While the pottery appears basically of the same pattern, the statement that the sites usually show signs of European contact removes them from direct association with the sites covered by the River Basin Surveys. It is probable that these sites represent, as Sayles points out, the early historic occupants—the Attakapans.

The sites of the Addicks Basin, then, represent a people Southeastern in origin and basic affiliations, who, marginal to the main stream of cultural achievement, seem to have developed slowly and in relative isolation. This is attested to by the essentially homogeneous but static culture complex. In late prehistoric times they came into the sphere of influence of the peoples to the west and northwest. During this time the bow and arrow was probably introduced, and certainly new and distinctive forms of projectile points and knives. Nevertheless, the culture pattern remained Southeastern in character until the final abandonment, perhaps around the year A. D. 1600.

APPENDIX

Table 9.—*Trait list for Addicks Basin sites* [1]

Trait list	Levels		
	Upper	Middle	Lower
General traits:			
Sites alongside stream on natural knoll	x	x	x
Midden deposit	x	x	x
Burial complex:			
Flexed	5	------	------
Semiflexed	1	1	------
On back	3	------	------
On left side	2	------	------
On right side	1	1	------
Orientation east	1	1	------
Orientation west	1	------	------
Orientation southeast	1	------	------
Orientation southwest	2	------	------
Orientation north-northeast	1	------	------
Oval pit	x	?	------
With burial furniture	?	?	------
Material culture:			
Pottery complex:			
Goose Creek Plain	x	x	------
Goose Creek Incised	x	x	------
Elongate jar, wide mouth	x	x	------
Wide mouth bowl, simple contour	x	x	------
Calcium phosphate temper	x	------	------
Sherd temper	?	------	------
Sand temper	x	x	------
Direct rim	x	x	------
Sharp lip	x	x	------
Rounded lip	x	x	------
Flattened lip	x	x	------
Figurines	?	------	------
Worked sherds	?	?	------
Lithic complex:			
Projectile points:			
Perdiz Pointed Stem	x	------	------
Scalhorn Stemmed	x	------	------
Eddy Stemmed	x	------	------
Alba Barbed	x	------	------
Kobs Triangular	x	------	------
Provisional Type 1	x	------	------
Provisional Type 2	x	------	------
Provisional Type 3	x	------	------
Provisional Type 4	x	------	------
Gary Stemmed	x	(2)	x
Wells Contracting Stem	?	?	------
Provisional Type 5	?	?	------
Provisional Type 6	?	x	x
Provisional Type 7	?	x	x
Provisional Type 8	?	x	x
Provisional Type 9	x	x	?
Provisional Type 10	?	x	------
Provisional Type 11	?	x	x
Provisional Type 12	------	x	x
Provisional Type 13	?	?	------
Provisional Type 14	------	------	x
Provisional Type 15	------	------	x
Provisional Type 16	------	x	------
Provisional Type 17	------	------	x
Provisional Type 18	------	x	x
Provisional Type 19	------	x	x
Provisional Type 20	------	------	x
Pedernales Indented Base	------	------	x
Provisional Type 21	------	x	x
Provisional Type 22	x	x	x
Provisional Type 23	?	x	x
Provisional Type 24	------	x	------
Clovis Fluted	------	------	x
Provisional Type 25	------	?	?
Provisional Type 26	------	?	?
Provisional Type 27	------	------	?
Provisional Type 28	------	------	?
Provisional Type 29	------	?	------
Provisional Type 30	------	?	?
Provisional Type 31	------	?	?
Provisional Type 32	------	?	?
Copena Point	------	?	------
Plainview Point	------	------	?
Baird Beveled Point	------	?	?

See footnotes at end of table.

TABLE 9.—*Trait list for Addicks Basin sites* [1]—Continued

Trait list	Levels		
	Upper	Middle	Lower
Material culture—Continued			
Lithic complex—Continued			
Miscellaneous lithic artifacts:			
Knives:			
Type 1a	------	?	?
Type 1b	x	------	------
Type 1c	x	------	------
Type 1d	------	x	?
Type 2	x	x	x
Type 3	x	x	x
Type 4	x	x	x
Type 5	x	x	------
Type 6a	x	------	------
Type 6b	x	------	------
Scrapers:			
Stemmed end	?	x	x
Large end	x	------	------
Small end	x	x	------
Large side	x	x	------
Small side	x	x	x
Flake	x	x	x
Choppers:			
One end modified	x	x	x
All sides modified	x	x	x
Flaked celt	------	?	?
Drills:			
Type 1a	x	------	------
Type 1b	x	------	------
Type 1c	x	------	------
Type 2a	x	?	x
Type 2 b	x	x	x
Type 3	?	?	?
Gravers	x	x	x
Eccentric flint	------	x	------
Ground stone:			
Atlatl Weights (banner stones)	------	------	?
Sandstone saws and abraders	x	------	------
Milling stone	x	------	------
Handstone	x	------	------
Hammerstones	x	x	x
Paint pigments	x	x	------
Bone:			
Cut bone awls	x	?	x
Ulna spatula	------	x	------
Antler:			
Projectile points	------	x	x
Bead	x	------	------
Worked tines	x	x	------
Shell:			
Pendants	x	------	------

---

[1] Symbols: x=known presence of trait; ?=probable presence of trait; numeral indicates the number of occurrences where that data is relevant.
[2] Prevalent.

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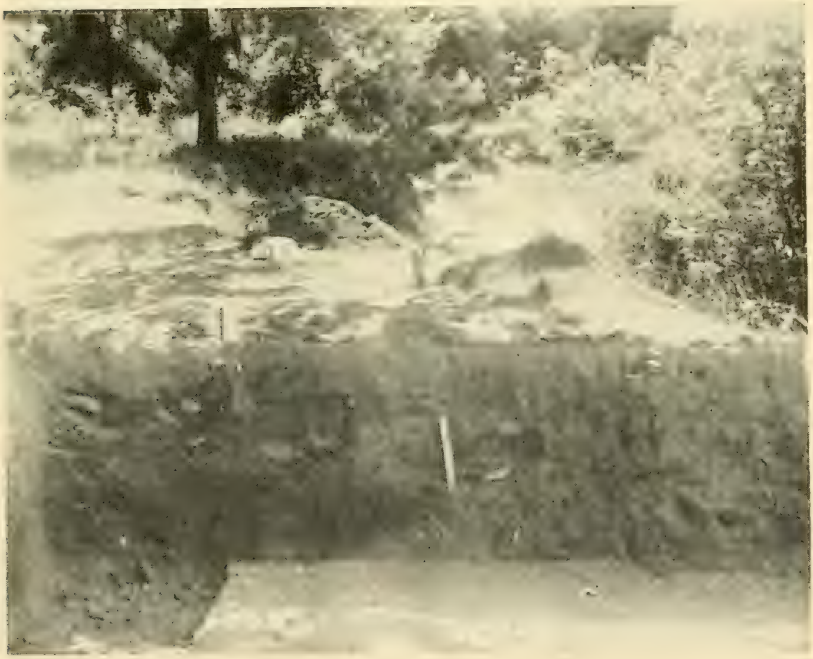
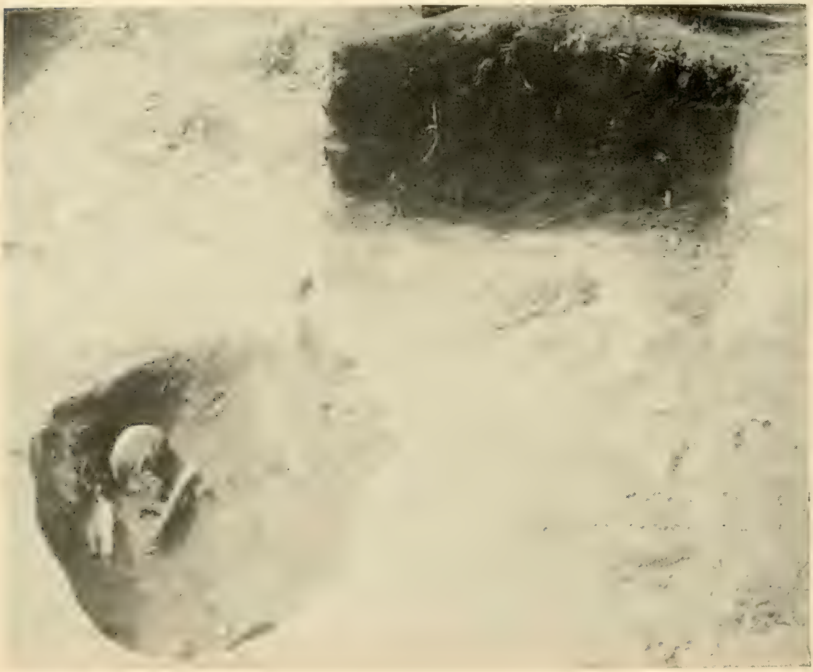
a



b

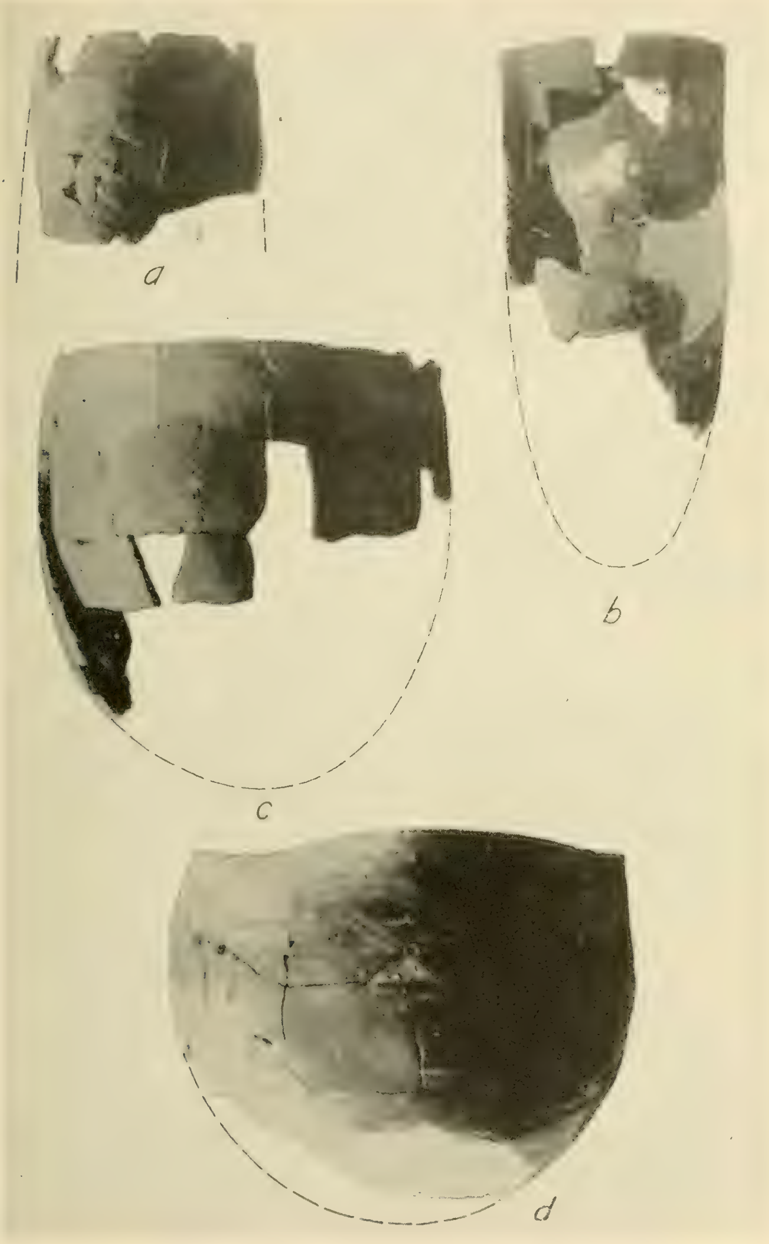
Doering site and profile. *a*, View from the west bank of South Mayde Creek. *b*, Profile at 1 East.

a

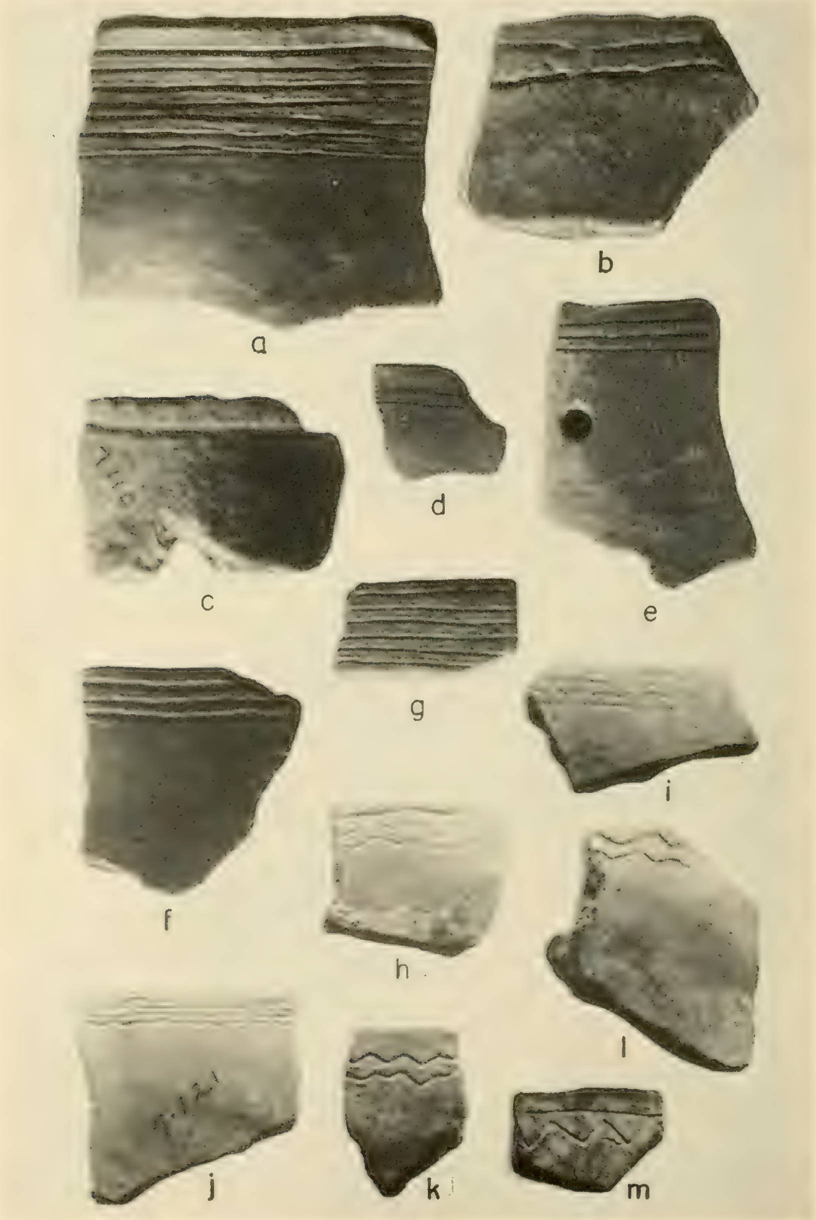


b

Kobs site. *a*, View before excavation. *b*, View of excavation showing Burial 6 in foreground.



Pottery: Restored vessels, Goose Creek ware.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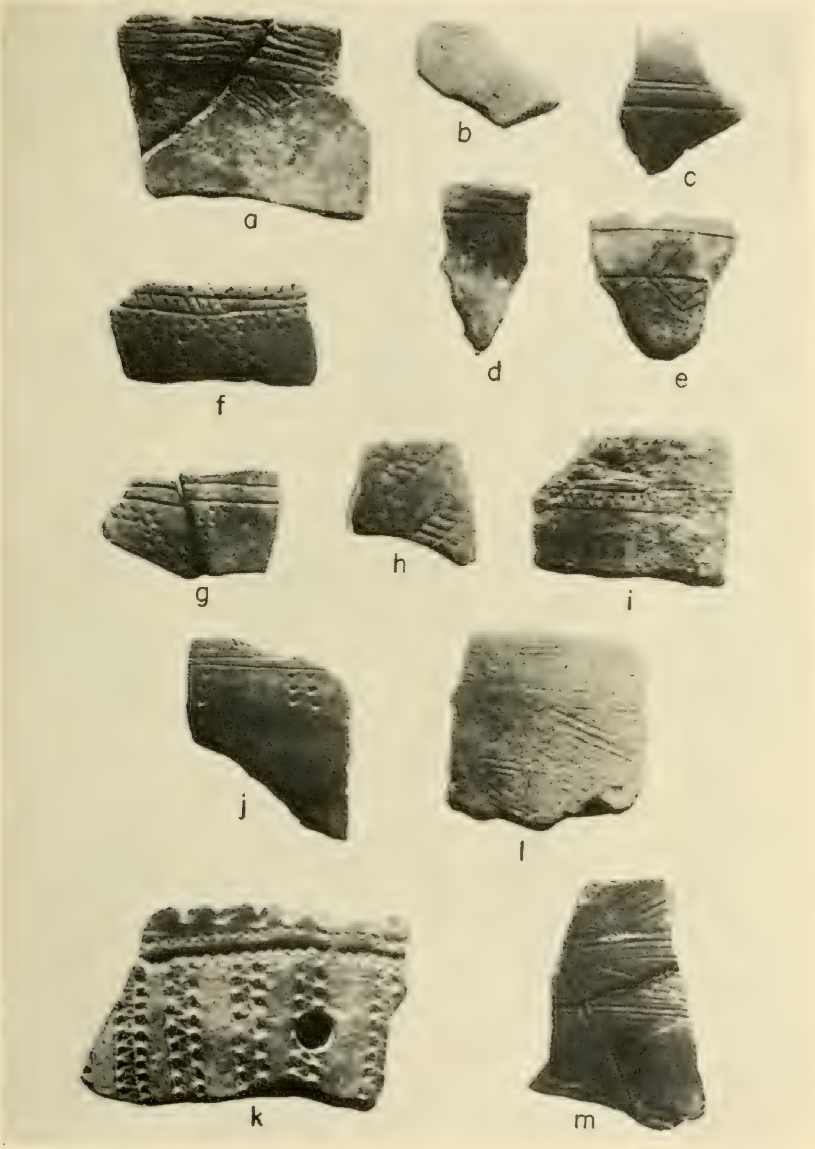
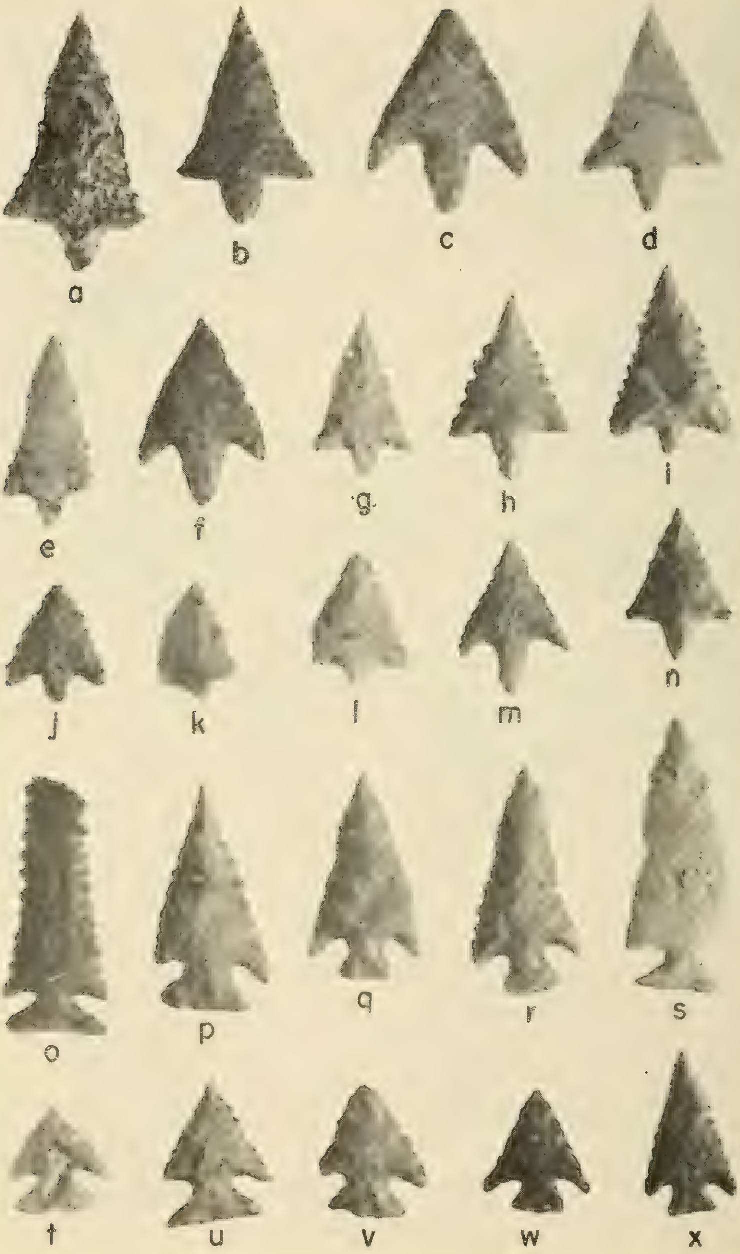
Pottery: Decorated sherds, Goose Creek Incised.



Pottery: Decorated sherds. *a–j*, Goose Creek Incised. *k*, Tchefuncte Stamped. *l*, *m*, Unidentified ware.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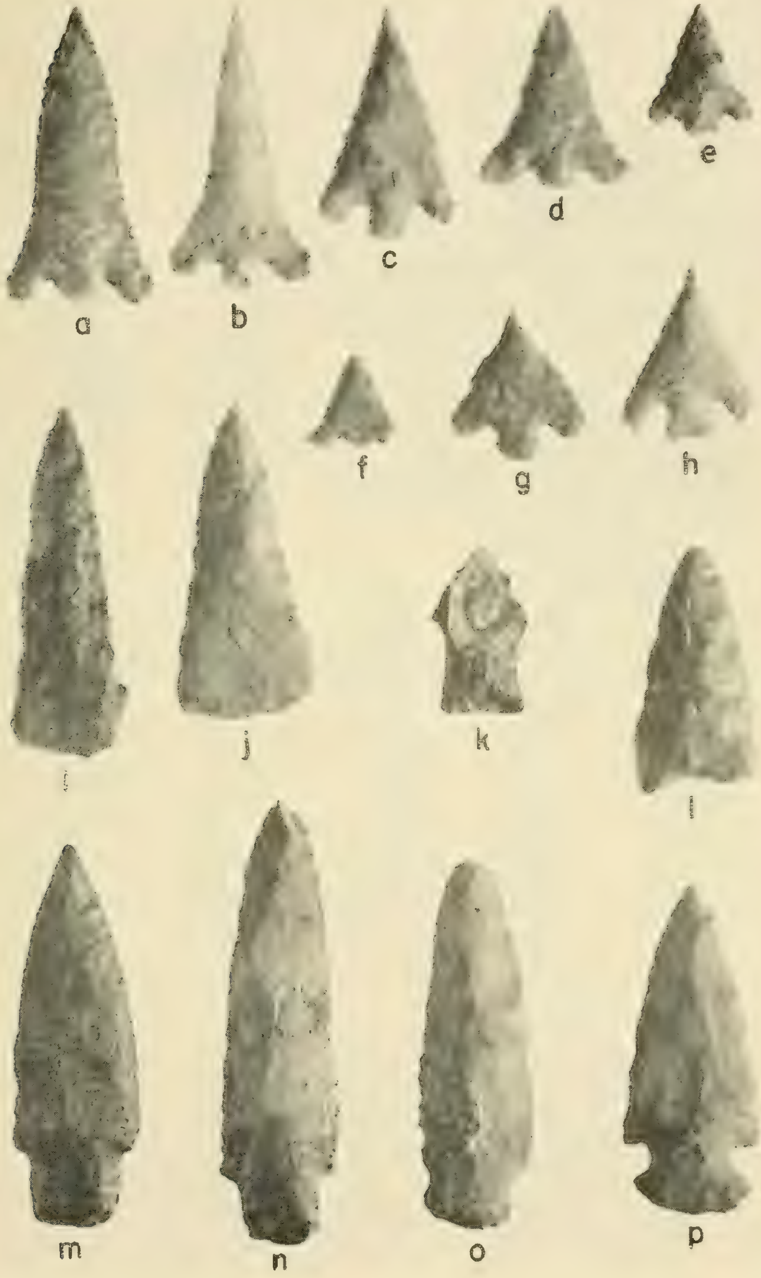
Projectile points. *a–n*, Perdiz Pointed Stem. *o–s*, Scalhorn Stemmed. *t–x*, Eddy Stemmed. *s*, Length, 45 mm. (1.78 in.).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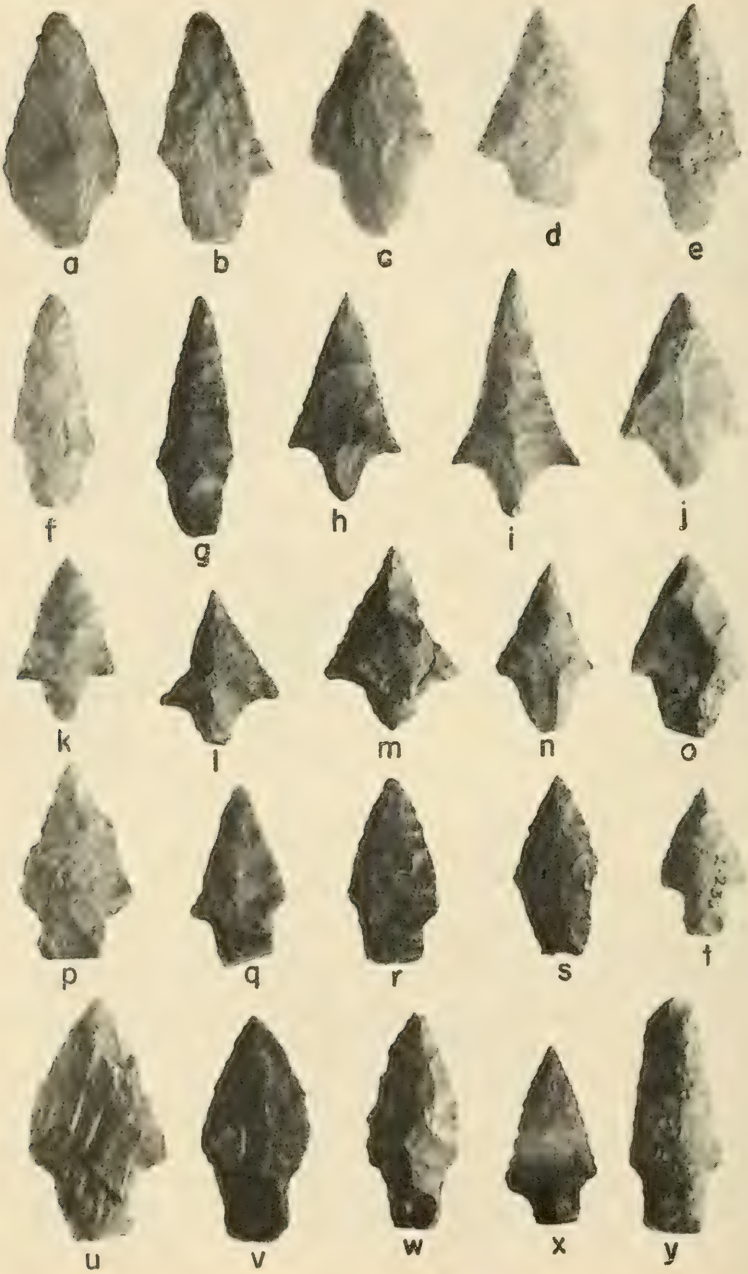
Projectile points. *a–h*, Alba Barbed. *i*, *j*, Kobs Triangular. *l*, *p*, Provisional types. *m–o*, 2. *k*, 3. *l*, 4. Length of *n*, 70 mm. (2.76 in.).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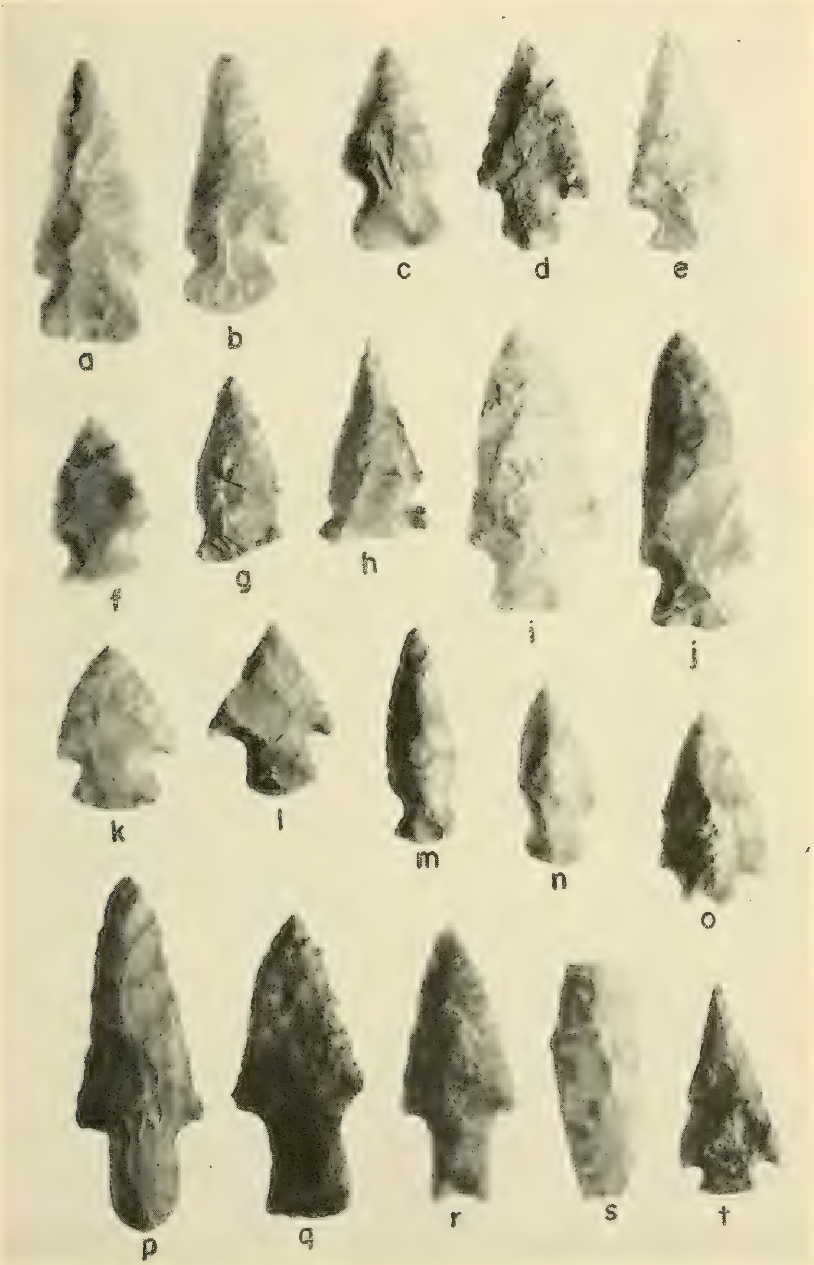
Projectile points: Gary Stemmed type. Length of *i*, 56 mm. (2.20 in.).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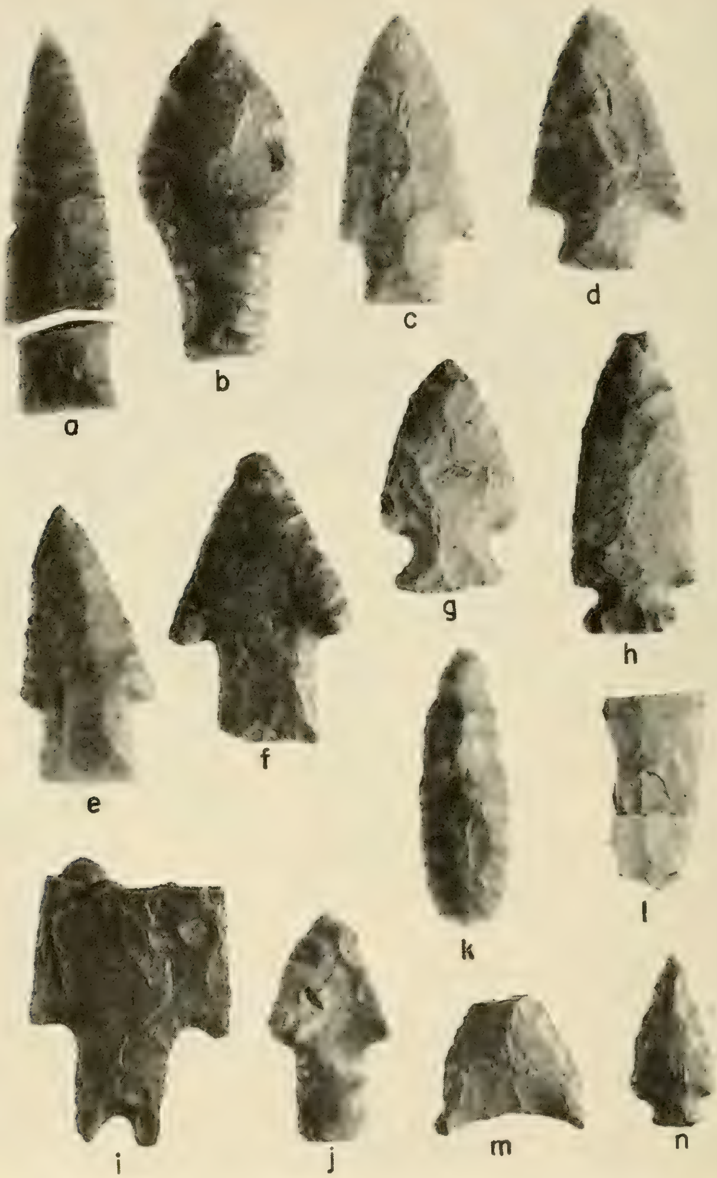
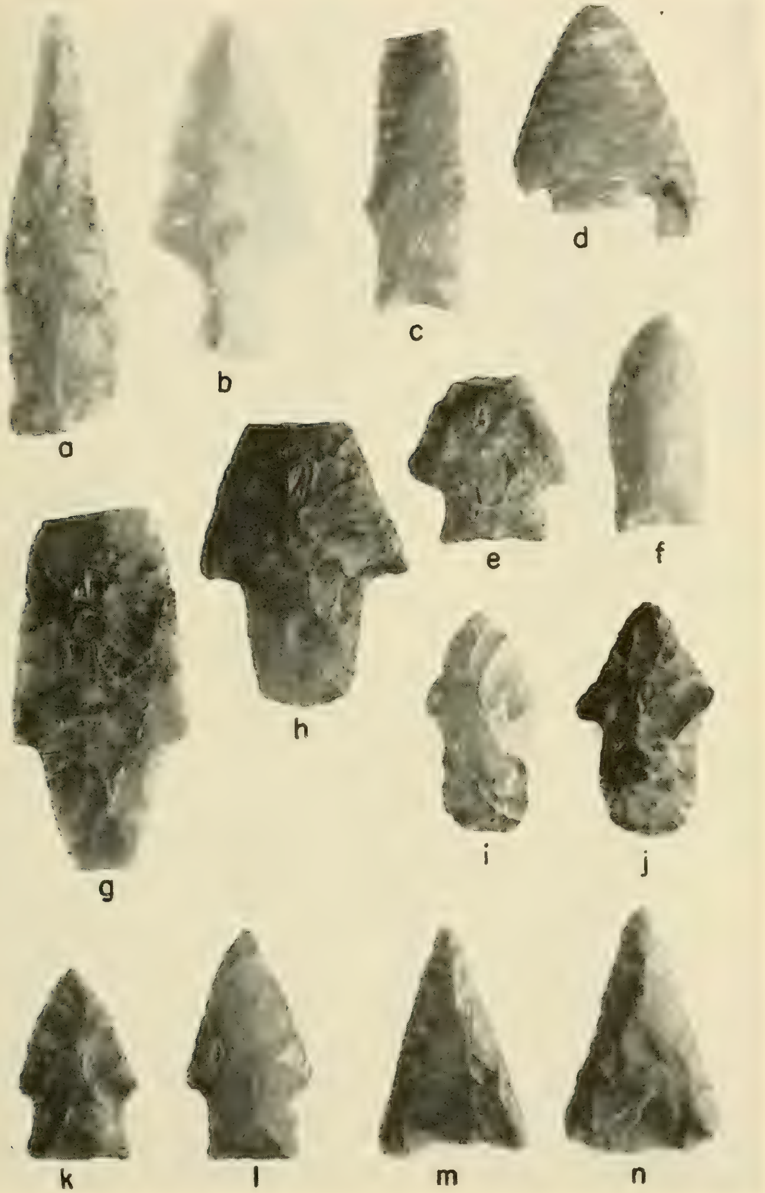
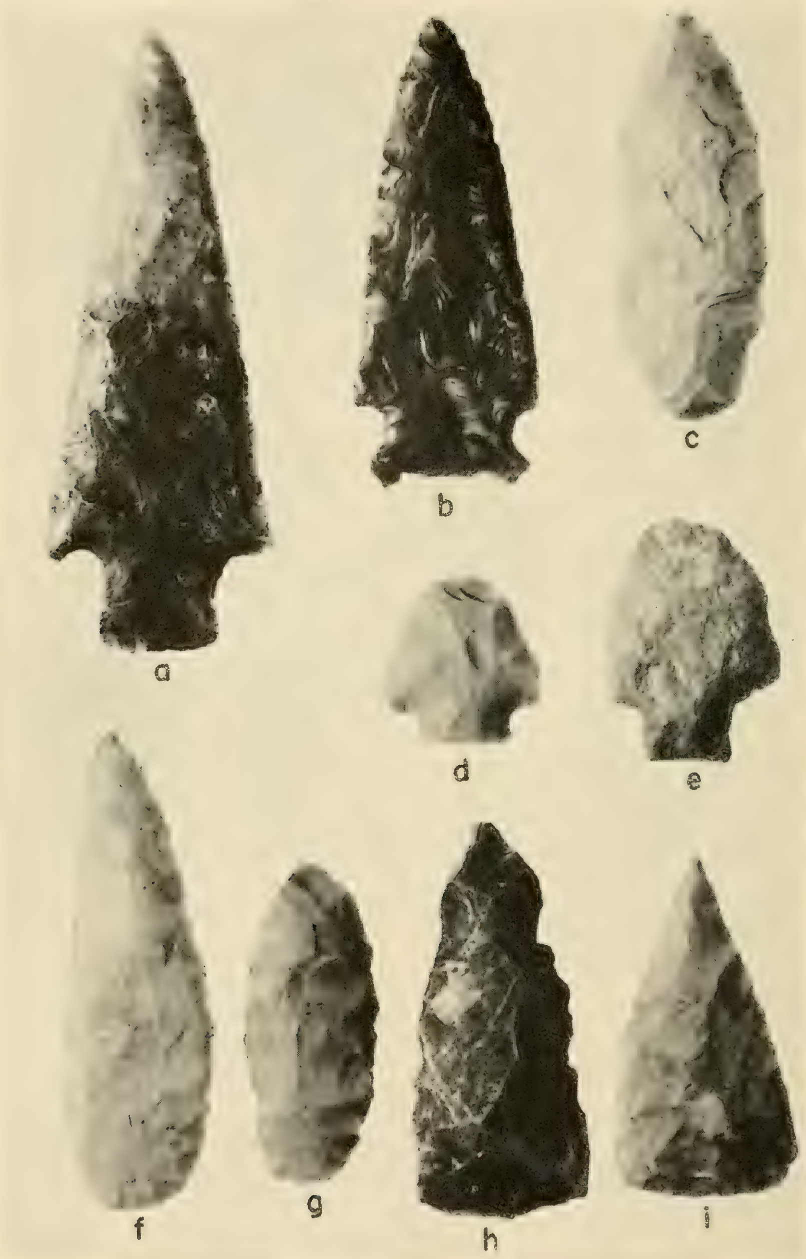
Projectile points: Provisional Types. *o*, 5. *d*, *e*, 6. *f–h*, 7. *i*, *j*, 8. *k*, *l*, 9. *m*, *n*, 10. *a–c*, 11. *p*, *q*, 12. *r*, 13. *t*, 14. *s*, Wells Contracting Stem. Length of *p*, 72 mm. (2.83 in.).



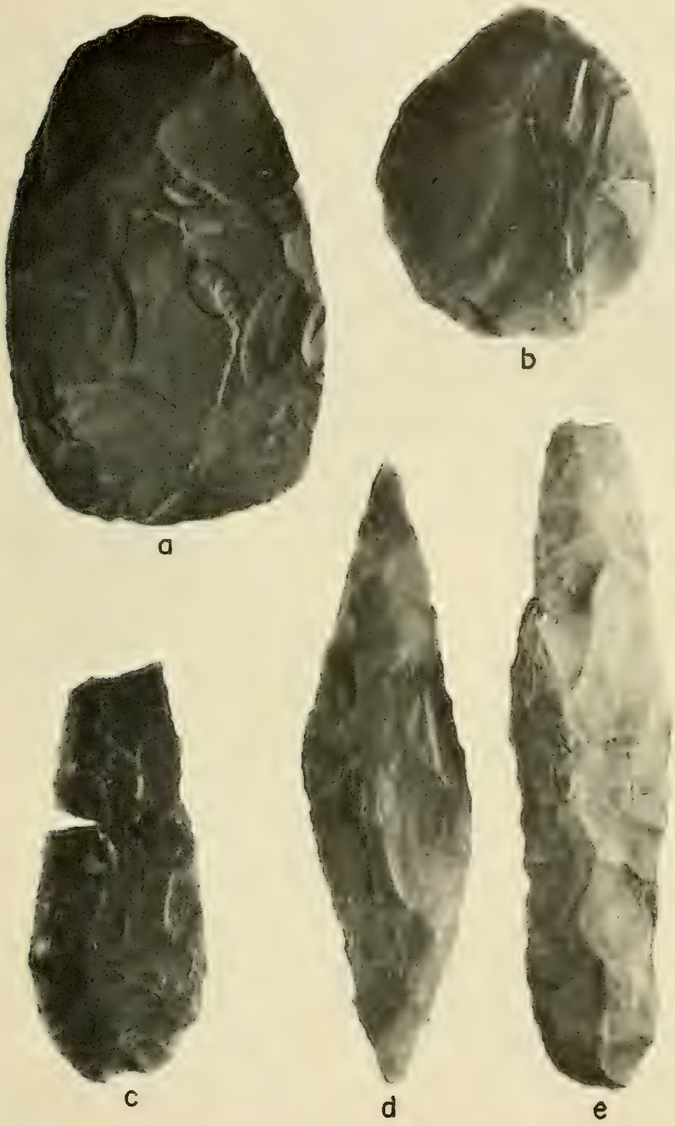
Projectile points: Provisional Types. *a*, 15. *b*, 16. *c*, 17. *d*, 18. *e*, *f*, 19. *g*, *h*, 20. *j*, 21. *n*, 22. *k*, 23. *m*, 24. *i*, Pedernales Indented Base. *l*, Clovis Fluted (?). Length of *b*, 67 mm. (2.64 in.).



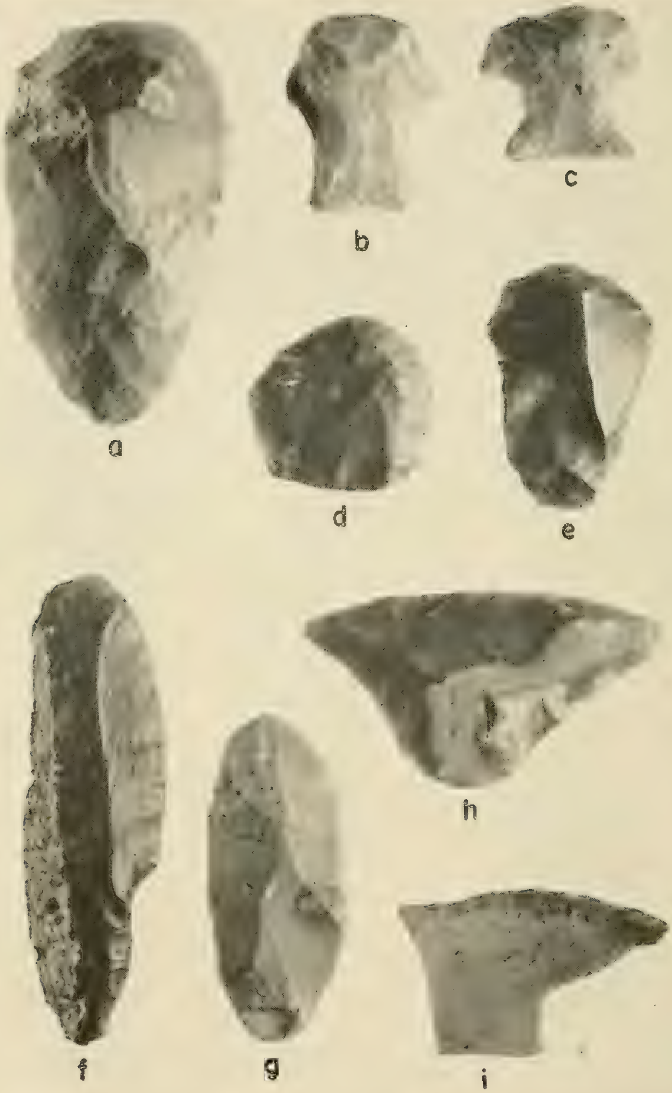
Projectile points, unplaced chronologically: *a*, Copena. *f*, Plainview. *m*, *n*, Baird Beveled. Provisional Types: *b*, 25. *c*, 26. *d*, 31. *e*, 32. *h*, 27. *g*, 28. *i*, *j*, 29. *k*, *l*, 30. Length of *a*, 76 mm. (3.01 in.).



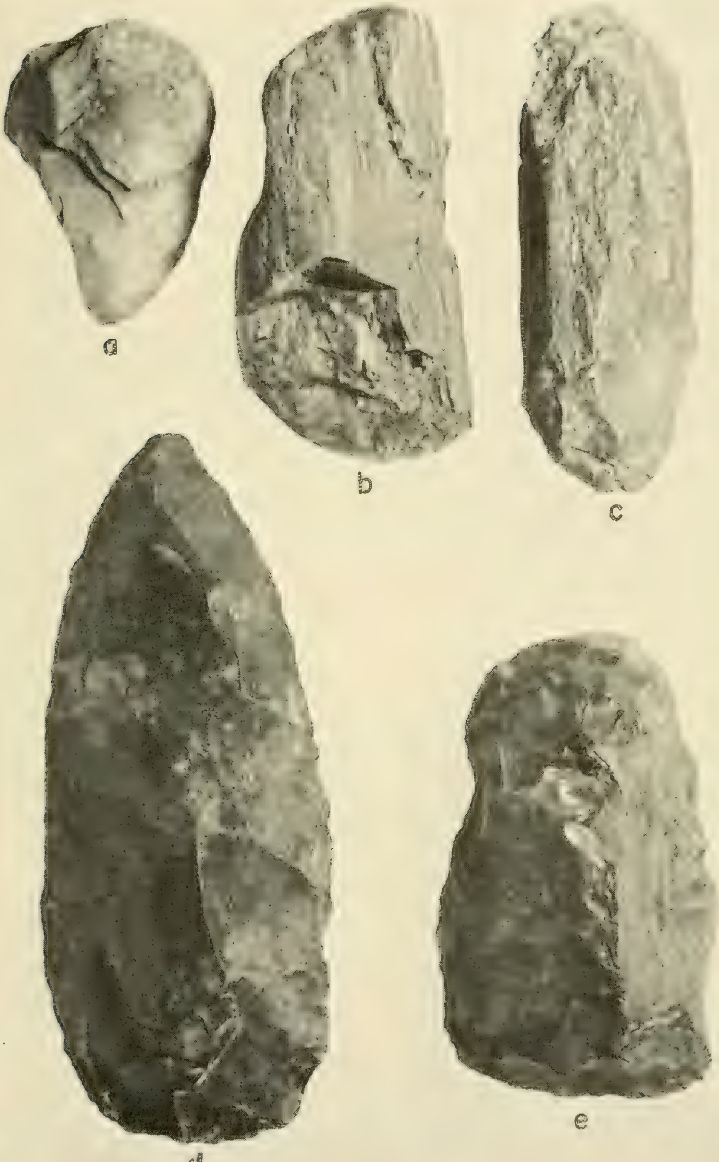
Knives. *a*, Type 1a. *b*, Type 1b. *c*, Type 1c. *d*, *e*, Type 1d. *f*, *g*, Type 2. *h*, *i*, Type 3. Length of *a*, 109 mm. (4.25 in.).



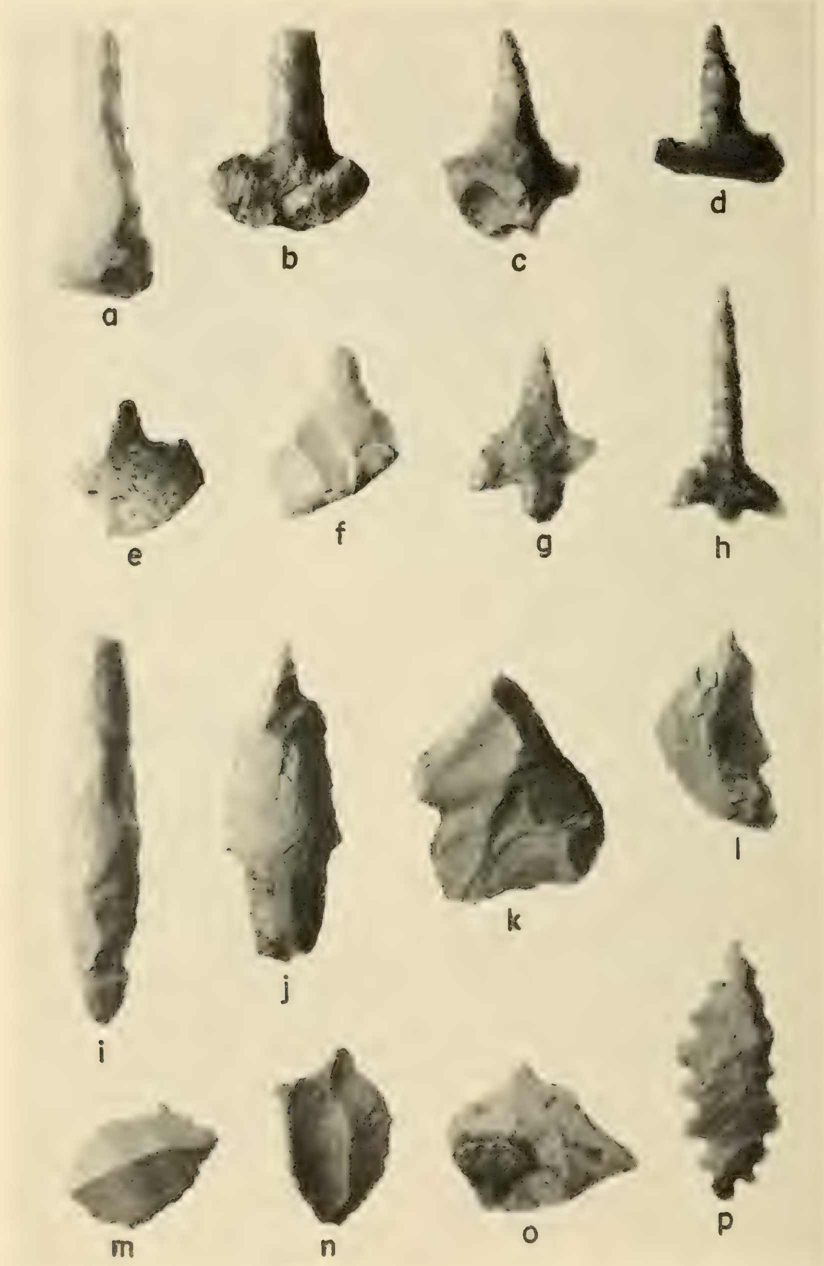
Knives. *a*, *b*, Type 4. *c*, Type 6a. *d*, Type 6b. *e*, Type 5. Length of *e*, 108 mm. (4.22 in.).



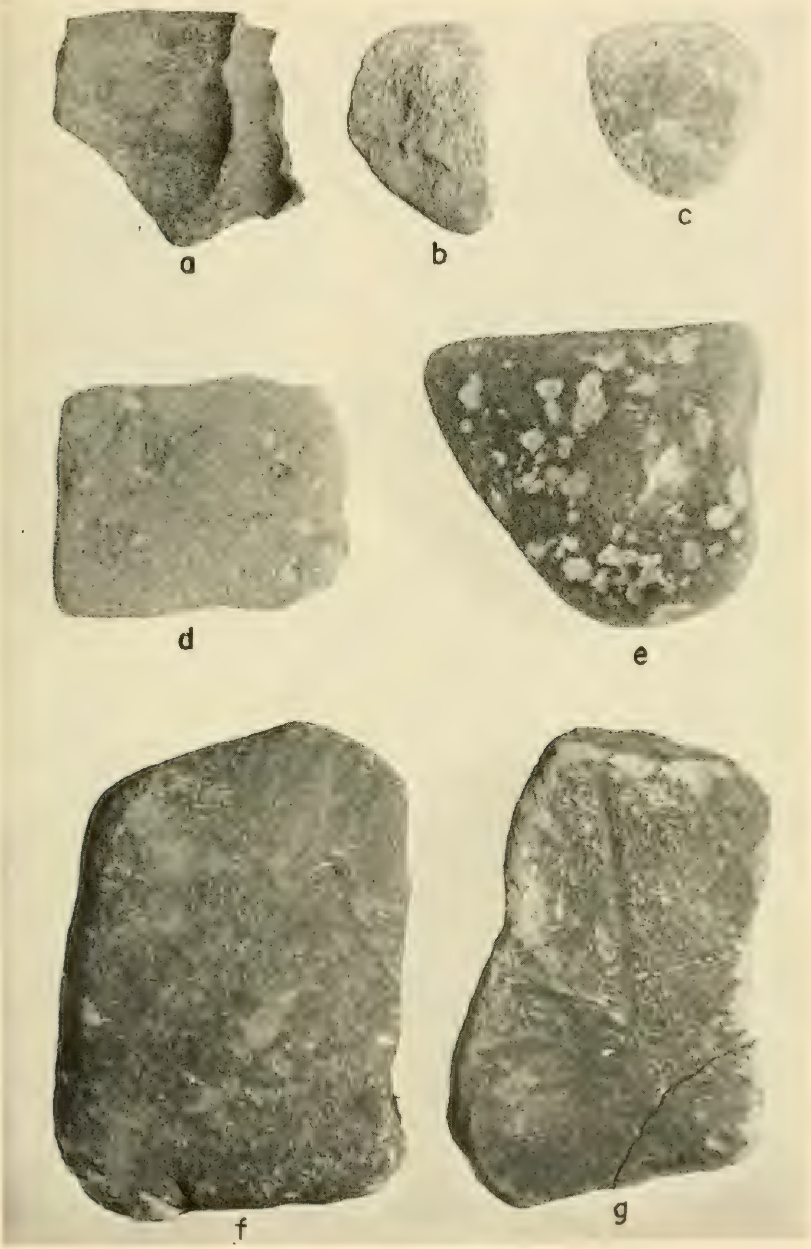
Scrapers. *a*, End scrapers, large. *b*, *c*, End scrapers, stemmed. *d*, *e*, End scrapers, small. *f–i*, Side scrapers, small. Length of *f*, 76 mm. (3.01 in.).



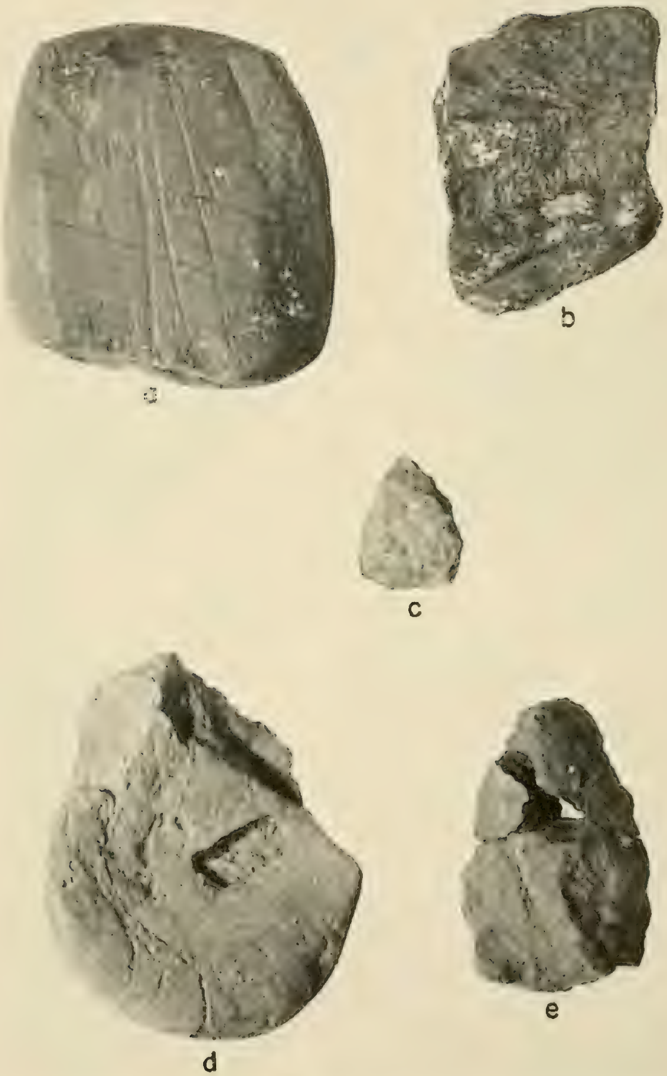
Choppers. *a*, *b*, One end unmodified. *c*, *e*, Both ends modified. *d*, Celt. Length of *d*, 137 mm. (5.37 in.).



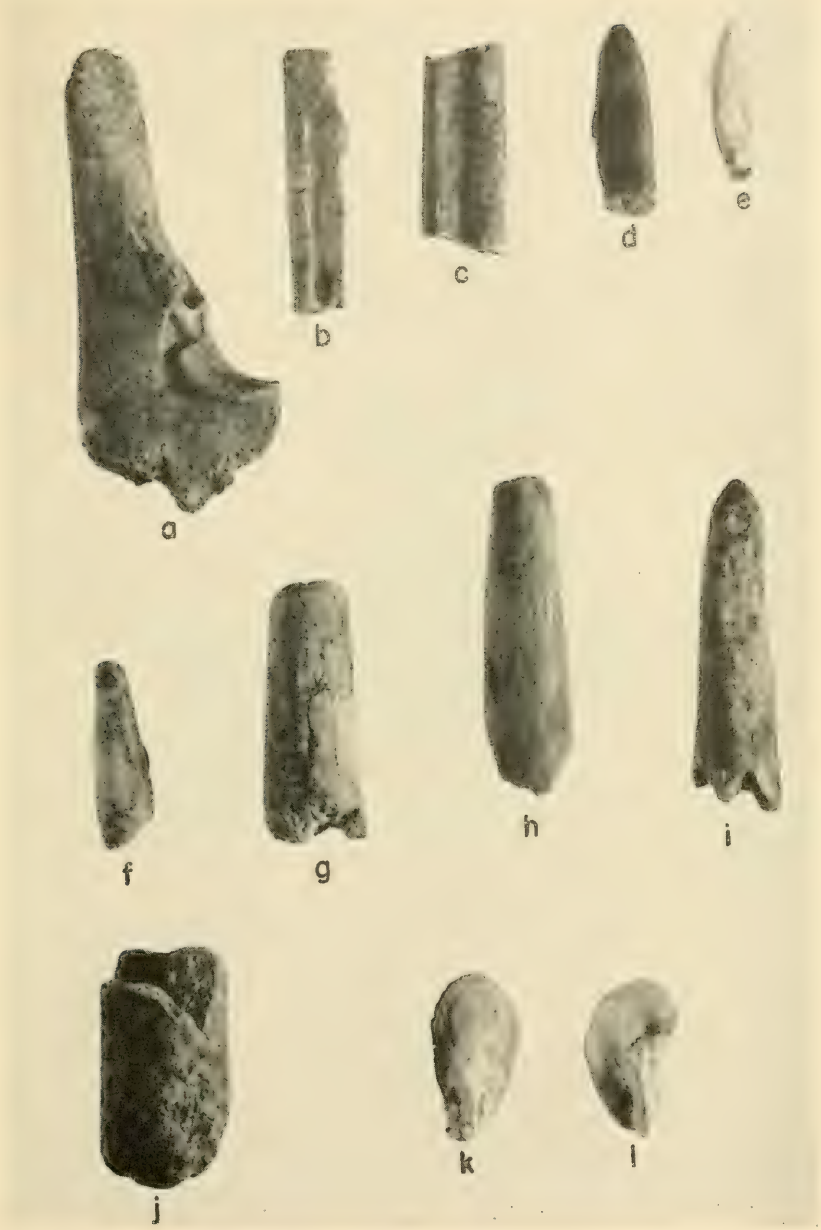
Drills, gravers, and eccentric flint. Drill types: *a*, *b*, 1a. *c*, *d*, 1b. *e*, *f*, 1c. *g*, *h*, 2b. *i*, 3. *j*, 2a. *k–o*, Gravers. *p*, Eccentric flint. Length of *i*, 57 mm. (2.26 in.).



Ground stone. *a*, Atlatl weight. *b–e*, Sandstone abraders and saws. *f*, Handstone. *g*, Milling stone. Greatest diameter of *f*, 106 mm. (4.18 in.).



Miscellaneous minerals and paint pigments. Length of *d*, 63 mm. (2.48 in.).



Artifacts of bone, antler, and shell. *a*, Ulna spatula. *b–e*, cut bone awls. *f*, *g*, Worked antler tines. *h*, *i*, Antler projectile points. *j*, Bead (?). *k*, *l*, Shell pendants. Length of *a*, 71 mm. (2.79 in.).

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Bureau of American Ethnology
Bulletin 154

River Basin Surveys Papers, No. 4

The Addicks Dam Site

II. Indian Skeletal Remains from the Doering and Kobs Sites, Addicks Reservoir, Texas

By MARSHALL T. NEWMAN

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CONTENTS

PAGE
Introduction 527
Description 258
Analysis 264
Literature cited 266

FIGURES

24. Stereograph contour of the skull from Burial 2 258
25. Stereograph contour of the skull from Burial 4 260
26. Stereograph contour of the skull from Burial 5 262
27. Stereograph contour of the skull from Burial 6 262
28. Stereograph contour of the skull from Burial 7 263

INDIAN SKELETAL REMAINS FROM THE DOERING AND KOBS SITES, ADDICKS RESERVOIR, TEXAS

By Marshall T. Newman

INTRODUCTION

The purpose of this report is to describe and analyze the skeletal remains from burials 1, 2, 3, and 4 (Doering site) and 5, 6, 7 (Kobs site). Due to their fragmentary nature, few measurements could be taken, and much of the description is in terms of morphological observations. Unfortunately, these observations are more subjectively determined than are the measurements, and hence are less useful in comparisons with the work of others. For this reason, most of the comparative analysis has to be based upon a few actual or estimated measurements and upon the stereographic drawings of the skull vaults (figs. 24–48). These drawings are approximately ½ life size.

The comparative data from the Texas coast has been taken from an unpublished State-wide study by Dr. Marcus S. Goldstein. In addition to permitting the writer to use his study, Dr. Goldstein was also kind enough to examine the Doering-Kobs material. His comments, based upon first-hand experience with a great deal of Texas skeletal material, are most valuable and have been incorporated in the present report.

Both Dr. Goldstein and the writer are reluctant to make any sweeping interpretations of the Doering-Kobs material. There simply is not enough of it, and even after careful restoration it is still fragmentary. But it possesses definite value since it is archeologically documented material.

While burial 1 has been tentatively assigned to the middle phase of occupation at the Doering site, the other burials (2–7) were probably made in intrusive pits from the thin midden surface of both sites, most likely during the late phases of occupation (see pp. 238–239). The absence of European trade materials suggests the sites were not occupied in historic times. From an archeological standpoint, then, the remains of burials 2–7 can be considered as one series. In a

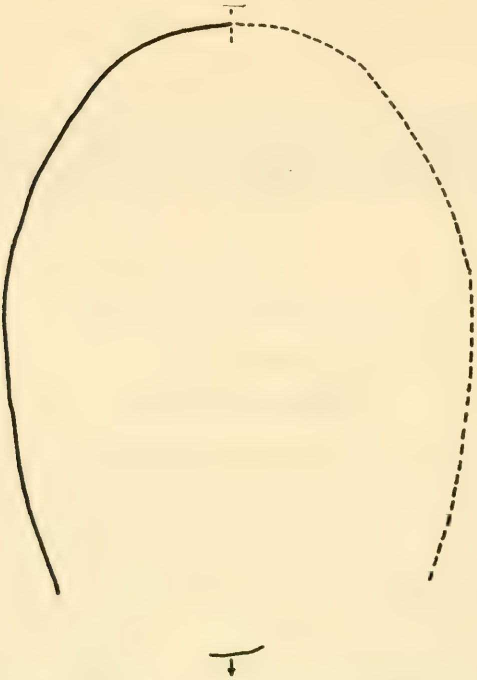

FIGURE 24.—Stereograph contour of the skull from Burial 2. (Approximately ½.)

properly tentative way, Wheat has linked the Doering and Kobs sites with the Akokisa band of Atacapan-speakers, who occupied the area at the time of the earliest French and Spanish explorations (see pp. 245–246). Thus, for present purposes, the series from burial 2–7 is probably late or protohistoric, and possibly Atacapan.

The measurements and observations were made according to techniques previously discussed (Newman, 1947, appendix A, B). The contour drawings were made with the Schwarz stereograph. No photographs of skulls are included because of their fragmentary nature.

DESCRIPTION

Burial 1 (*Doering site*).—Unrestorable skull fragments, almost intact lower jaw, incomplete long bones, fragmentary pelvis and ribs of a middle-aged (36–55 years) male. One skull fragment shows a "pinched" occiput, suggesting a long-headed individual. No occipital deformation is apparent. Strong areas for muscle attachment on the skull are indicated by large mastoid processes and a large mound-type occipital torus. The lower jaw is massive, with a mediobilateral chin of medium projection, and strongly everted gonial angles. No teeth were lost during life, but heavy (fourth degree) wear into the dentine exposed the pulp cavities of three of the molars. Apical abscesses resulted, apparently involving the antrum in one case. The wear is diagonal, heaviest on the lingual surfaces of the upper teeth and the buccal surfaces of the lower teeth.

Since only the condyles and part of the most distal shaft are missing from the right femur, an estimate of the dimensions of these missing parts was based upon a comparable femur from another collection. This gives an estimated maximum length of 430 mm. and suggests a short stature in the neighborhood of 162–163 cm.

Burial 2 (*Doering site*).—Partly restorable undeformed skull, part of right maxilla, most of lower jaw, and a few very small long bone and pelvic fragments of a middle-aged individual—probably female. The sphenoid-shaped vault and "pinched" occiput suggest a long-headed individual. Cranial deformation is absent. Other skull characteristics are: small, divided-type browridges; low forehead of medium slope; medium development of median frontal and sagittal crests; small parietal bosses; medium temporal fullness; small mastoid processes; medium lambda position; and a ridge-form occipital torus of medium size. The lower jaw is small, with narrow bilateral chin form, and only slight chin projection. The eversion of the gonial angles is medium. The lower right molar was lost during life through exposure of its pulp cavity by wear, with an apical abscess resulting. The pulp cavity of the opposing upper molar was also exposed, but caused no apparent abscess. All the first molars present show excessive (fourth degree) wear, especially on the lingual surfaces of the upper and the buccal surfaces of the lower teeth, where the entire crown and neck structure has been worn away. The second molars are less worn, although no enamel remains on their occlusal surfaces. The third molars show even less wear, with the dentine only visible in spots. No caries is present except in the cases of exposure already noted.

TABLE 1.—*Cranial measurements and indices*

Measurements (mm.) and indices	No. 1 male	No. 2 female?	No. 4 male	No. 5 female?	No. 6 female	No. 7 male
Glabello-occipital length	----------	182	184	(188+)	172	186
Maximum breadth	----------	----------	[1](150+)	[2]128	122	133
Basion-bregma height	----------	----------	----------	(130)	(123)	----------
Auricular height	----------	----------	121	(119)	----------	114
Minimum frontal diameter	----------	----------	96	----------	86	90
Breadth of ascending ramus	34	32	38	30	30	33
Length-breadth index	----------	[2]75	(81.5)	[2]68	70.9	71.5
Mean height index	----------	----------	----------	(82.3)	(83.7)	----------
Length-auricular height index	----------	----------	65.7	(63.3)	----------	61.3
Module	----------	----------	----------	(148.7)	(139.0)	----------

[1] Figures in parentheses are close approximations.
[2] Estimates.

Burial 3 (*Doering site*).—Partly restorable skull vault, facial fragments, part of lower jaw, fragments of femoral and tibial shafts and pelvis, bodies of three cervical vertebrae of a young adult (21–35 years), probably female. What there is of the vault suggests a moderately long-headed individual. There is slight flattening on the occiput just above the inion, which may not be artificial. Other skull observations: small, divided-type browridges with a medium glabella; low forehead of medium slope; small frontal bosses with no median crest in-between; medium mastoid processes; medium occipital form; medium-sized ridge-type occipital torus. The lower jaw is medium in size, with a narrow bilateral chin. Gonial eversion is pronounced. All teeth, except a heavily worn upper incisor, were either lost or broken off after death.

The lower jaw exhibits a hook-shaped excrescence of bone just below the left mental foramen, which is probably of traumatic origin. The three bodies of cervical vertebrae show considerable crushing and lipping, probably arthritic.

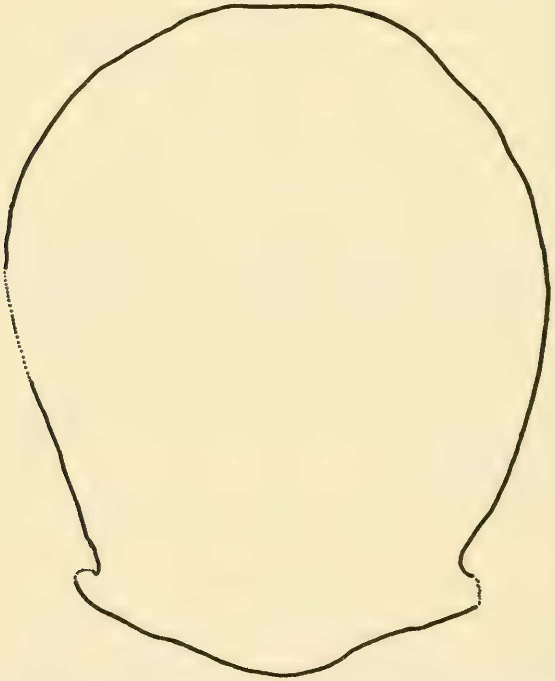

Figure 25.—Stereograph contour of the skull from Burial 4. (Approximately ½.)

Burial 4 (*Doering site*).—Partly restorable skull, with parts of the face, most of the lower jaw, large portions of both femora, tibiae, humeri, pelvis, and part of the radii, fibulae, and sacrum of a male in advanced middle-age. The skull is round and rather high-vaulted, with the length-breadth index estimated at 81.5, and the length-auricular height index 65.8. A trace of occipital flattening is present.

The strong areas for muscle attachment on the skull and long bones bespeak a very rugged individual. An estimated maximum length for the left femur of 455 mm. suggests a stature in the neighborhood of 166 cm. Skull observations: Medium-sized divided-type browridges; medium glabella; low forehead with pronounced slope; pronounced postorbital constriction; pronounced median frontal crest; medium sagittal elevation and parietal bosses; large mastoid processes; medium occipital curve; broad occipital form; large ridge-form occipital torus; deep glenoid fossae; massive malars and lower jaw; mediobilateral chin form with medium chin projection; pronounced eversion of gonial angles. Tooth loss cannot be determined. Wear on the three remaining lower molars is fourth degree. No mandibular caries is present, but two apical abscesses resulting from pulp exposure are evident. On the mandible the left first premolar is in inverted position, with part of its crown showing through the mandibular bone on the lingual surface. The corresponding tooth on the right side erupted in normal orientation, but is misplaced toward the lingual side.

A bony fusion of the left fibula and tibia took place about midshaft, and may be traumatic in origin. The body of the fifth lumbar vertebra shows heavy (arthritic?) lipping, as does the corresponding articular surface on the sacrum.

Burial 5 (*Kobs site*).—Part of the skull vault and base, showing anterior crushing; most of lower jaw; shafts of both femora and tibiae; left humerus; part of left pelvis of a middle-aged individual, probably female. The vault dimensions and the stereographic contour indicate a long-headed skull, with an estimated length-breadth index over 68 from the measurements, and over 71 from the contour. Vault height appears low, with an estimated mean height index between 82 and 83. Flattening occurs in the obelionic region, more likely natural than artificial. Other cranial observations: pronounced sagittal elevation; small parietal bosses; slight temporal fullness; medium mastoid processes; pronounced occipital curve and low position of lambda; pinched occipital form; ridge-formed occiptal torus of medium size. The lower jaw is medium in size, with mediobilateral chin form and pronounced eversion of the gonial angles. No teeth are present for observation. The long bones are light and gracile.

Burial 6 (*Kobs site*).—Skull lacking most of left parietal, but with face and lower jaw; fragments of femoral, tibial, fibular and humeral shafts of an apparently young adult female. The skull is small, gracile, and long-vaulted, with a length-breadth index of 70.9. It is not very high-vaulted, and has an estimated mean height index of 83 to 84. Cranial deformation is absent. Other cranial data: small, divided-type browridges; small glabella; low forehead of pronounced

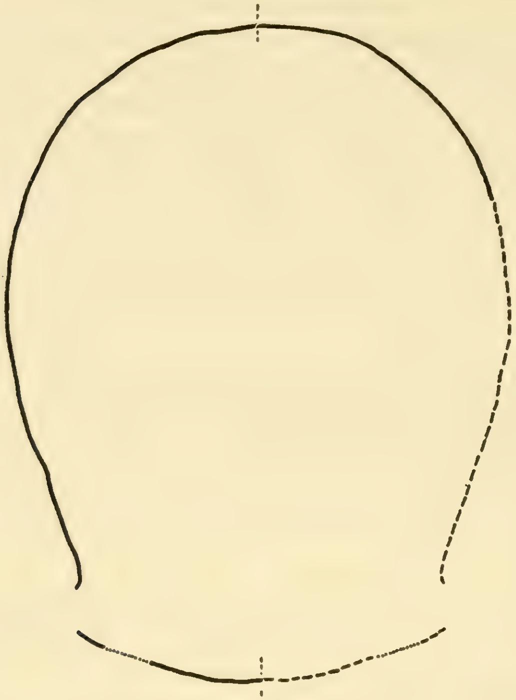

Figure 26.—Stereograph contour of the skull from Burial 5. (Approximately ½.)

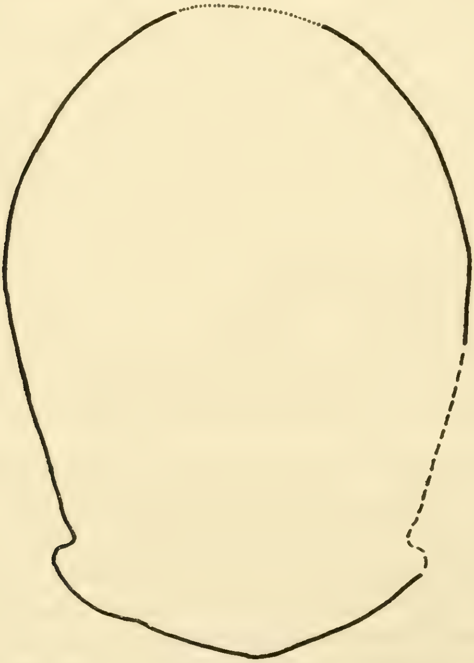

Figure 27.—Stereograph contour of the skull from Burial 6. (Approximately ½.)

slope with a large median frontal crest and small bosses; pronounced postorbital constriction and slight temporal fullness; medium mastoid processes; pronounced occipital curve, with low lambda position; pinched occiput; small mound-type occipital torus. Orbits are rectangular in form and medium in inclination; suborbital fossae are small; anterior malar projection pronounced; nasion depression slight; alveolar prognathism pronounced. The lower jaw is small, with a mediobilateral chin of slight projection, and medium eversion of gonial angles. No teeth were lost during life; no caries is present, and the wear is second degree (dentine visible).

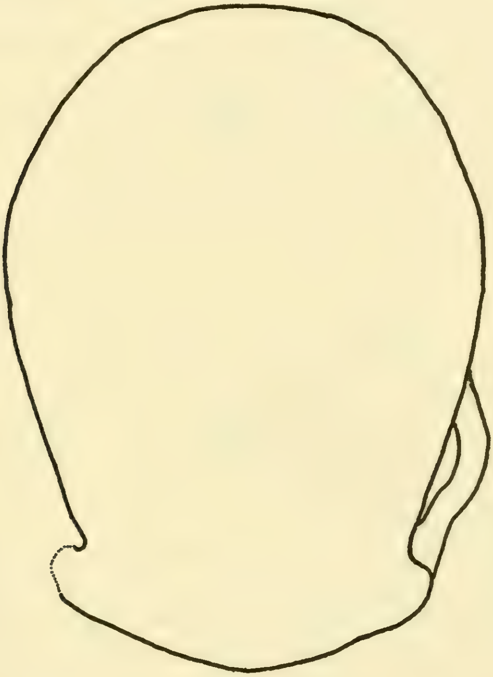

FIGURE 28.—Stereograph contour of the skull from Burial 7. (Approximately ½.)

Burial 7 (*Kobs site*).—Skull with fragments of face, almost complete lower jaw; complete right femur; fragments of left femur, both tibiae, humeri, radii, ulnae, pelvis; hand and foot bones; and a few ribs of a middle-aged male individual. The skull is long-headed (71.5) and rather low-vaulted (length-auricular height index 61.3). There is some (natural ?) lambdoid flattening. Other cranial data: medium-sized divided browridges; medium glabella; low forehead of pronounced slope; pronounced postorbital constriction; small frontal bosses; medium median frontal crest and pronounced sagittal elevation; over-medium parietal bosses; slight temporal fullness; large mastoid processes; pronounced occipital form; medium ridge-form torus. The lower jaw is large with wide bilateral chin form of medium projection, and pronounced eversion of gonial angles. No teeth were lost during life; the diagonal tooth wear is fourth degree, which in three cases exposed the pulp cavities and resulted in apical abscesses.

The long bones are long and slender. The measurable right femur has a maximum length of 482 mm., suggesting a stature of about 172 cm.

ANALYSIS

Racial position.—The fragmentary remains from Burial 1 (Doering site), which is the sole candidate for a middle occupation phase position, suggest long-headedness and short stature. This information is patently insufficient to permit any inferences concerning the middle phase population of the Addicks Reservoir area.

Burials 2–7, probably representing the late phase of occupation at the Doering and the Kobs sites, afford a better but still inadequate sample of the protohistoric population. Pooling of these remains may be justified from an archeological standpoint, since the late phase cultural remains from the two sites appear identical (see p. 257). Yet the physical differences between the skeletal remains from the two sites seem to call such pooling to question. In head form, for example, the three Kobs site skulls (Burials 5, 6, 7) are on the border of extreme long-headedness (c. 68, 70.9, 71.5 respectively). In this respect, they are similar to most precontact Texas crania from all but the eastern part of the state (Goldstein ms.). For the Doering site, however, the skull from Burial 2 is barely long-headed (c. 75), and the one from Burial 4 is definitely round-headed, with a closely approximated index of 81.5.

Morphological contrast between the Kobs site longheads and Burial 4 is afforded by several observations as well. The longheads have pronounced sagittal elevations and occipital curves, while Burial 4 is medium in both respects. The longheads also have pinched occiputs in contrast to the broad occiput of Burial 4. Any distinction in the long bones is difficult to appraise. The greater thickness and ruggedness of the shafts shown by Burial 4, as compared with the only Kobs site male (No. 7), may be only a function of shorter stature in the former.

The question raised by these physical differences may now be more fully stated: Are these differences of sufficient magnitude to make it unlikely that we are dealing with two samples of the same population? A final answer cannot be expected, but some indications are given by an inspection of Goldstein's figures for two other south Texas series. The first comes from the Caplen Mound on Galveston Bay, a historic site identified with the Atacapa.[1] The second series is from the Oso

Mound, Nueces County, which is probably Karankawa.[1] Limiting the comparison to the length-breadth index, the Caplen Mound range for 13 male and female skulls is 73.4–83.8. The three Kobs site skulls fall below this range, but fit into the Oso range of approximately 65–79.1 for 25 skulls of both sexes. The Doering site skull from Burial 4, on the other hand, fits into the Caplen range. According to Goldstein's observations, this skull would not be out of place in the Caplen series.

Whether the Kobs site skulls would be out of place in the Caplen series is the next question. To this, Goldstein has provided two answers. In the first place, he states that inland from the coast in the historic Atacapa area, long-headed skulls are more frequent (personal communication). Since the Addicks Reservoir area is some 60 miles from the coast, as compared to the littoral location of the Caplen Mound, increase in long-headedness might be expected in the former. Secondly, Goldstein's tables show that in all regions of Texas covered by his study, the pre- or protohistoric series are longer-headed than those from contact sites (Goldstein, n. d.). This seems precisely the contrast between the protohistoric Doering-Kobs series and the series from the historic Caplen Mound.

In the light of these arguments, the Doering-Kobs sample could have been drawn from one population, provided it is assumed that the sample represents the extremes in head form. This view is essentially a conservative one, consistent with the premise that meager data are more safely "lumped" than "split." The proviso to this view, however, is by no means conservative. Although it is impossible to appraise accurately the chances that the head-form extremes of a population could be present in an unselected sample of seven skulls, it is likely that they would not be high. As an alternate view, the Doering skulls could be considered representative of the Atacapa (Caplen Mound), and the Kobs skulls the Karankawa (Oso) people. Some credence is given this view by Neumann's (n. d., p. 70) pronouncement that the Atacapa of Louisiana and the northern part of the Texas gulf coast were the westernmost of the Centralids typical of the Southeastern States in late times. If this is so, the larger area including Addicks Reservoir could have been a meeting ground of these long-headed and round-headed peoples. On this basis, the alternate view as stated above seems plausible. But it is hardly demonstrable, at least in the writer's opinion, by the meager data furnished by seven fragmentary skulls lacking facial skeletons.

From a physical standpoint there are several other notable features, which cannot for the most part be used in a comparative analysis. Table 1 indicates that the two long-headed Kobs site females (Nos. 5,

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[1] Also reported on by Woodbury, 1937.

6) are not particularly high-vaulted, and in this respect most closely resemble the females from west Texas around the Big Bend (Goldstein, n. d.). The three female skeletons (Nos. 2, 5, 6) appear to be very light-boned and gracile, except possibly for their masticatory apparatus. Characteristic of the entire sample is a low forehead, with small frontal bosses, and medium to pronounced slope.

Cranial deformation.—There is no definitely artificial cranial flattening in the Doering-Kobs series. The closest approach is the trace of occipital flattening on the skull of Burial 4. Burial 3 shows a slight amount of flattening just above the inion, which seems a natural rather than artificial phenomenon. Burials 5 and 7 show some apparently natural flattening above lambda.

Pathology.—Manifestations of possibly traumatic origin are to be seen in the hooklike formation of bone on the lower jaw of Burial 3, and the midshaft fusion of the left tibia and fibula of Burial 4. There is no evidence of vault fractures.

The cervical vertebrae of Burial 3 and the fifth lumbar of Burial 4 show heavy lipping, probably of an arthritic nature.

Heavy and usually diagonal wear on the teeth led to pulp exposure and consequent caries and apical abscesses in the case of Burials 1, 2, 4, and 7. No teeth were present for observation in the cases of Burials 3 and 5. Burial 6 was caries-free, and wear was only second degree (dentine visible). The heavy wear with occasional pulp exposure is wholly in line with Goldstein's (1948) observations.

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The Hodges Site

I. Two Rock Shelters Near Tucumcari, New Mexico

By HERBERT W. DICK

CONTENTS

PAGE

Introduction 271
Excavation and stratigraphy 272
Worked stone 274
  Projectile points 274
  Side scrapers 276
  Snub-nosed scrapers 276
  Rough flake knives 277
  Refined knives 277
  Drills 278
  Choppers 278
  Hammerstones 279
  Manos 279
  Metates 279
  Mortars 280
Faunal material 280
  Animal bones 280
  Shells 280
Ceramics 281
Conclusions 282
Literature cited 283

ILLUSTRATIONS

PLATES

48. *a*, General view of the Hodges site. *b*, Area A at the beginning of excavation 284
49. *a*, Artifacts eroding out of the Number 2/3 fill under the rock fall in the shelter of Area A. *b*, Stratigraphy of section A–4, Area A 284
50. Trench in the remaining fill of Area B 284
51. Projectile points, drills, refined knives and snub-nosed scraper 284
52. Scrapers and rough flake knives 284
53. Manos, hammerstone, and choppers 284
54. Fresh-water shells, *Unimerus tetralasmus* Say 284

FIGURES

29. Stratigraphy of the trench excavated in Area B 272
30. Plan of Area A showing excavated portion and stratigraphy 273

TWO ROCK SHELTERS NEAR TUCUMCARI, NEW MEXICO

By Herbert W. Dick

INTRODUCTION

The excavation of the Hodges site was undertaken during August 1947, because the site was being looted by workmen from construction projects nearby. The site actually was not in danger of inundation but was being destroyed as completely as it would have been had the site fallen within the pool area. Secondary factors were to aid the geologist in determining the date of an alluvial deposit through cultural material and to obtain and record additional archeological evidence for determining cultural types, the way of life, and the history in east central New Mexico.

The geologic results are given in the second part of this dual report by Sheldon Judson, of University of Wisconsin, whose problem is that of determining the alluvial chronology of the region. The geologic study of the area was begun in 1941 by Judson.

Hodges site consists of two shallow rock shelters 8 miles southeast of Tucumcari, N. Mex.[1] (see Judson, fig. 32) on Plaza Larga Creek, an intermittent stream, which joins the Canadian River 21 miles to the north. The Plaza Larga Creek originates in the *breaks* or northern edge of the Llano Estacado (Staked Plains) 31 miles southwest of the Hodges site. This creek takes the name "Tucumcari Creek" for the lower half, after its confluence with Barranca Creek before entering the Canadian River.

The immediate area surrounding the site is characterized by low rolling hills which have little earth cover because of the erosional effects of the creek and its small tributaries (pl. 48, *a*). The creek has cut two units of a Triassic sandstone to a depth of 20 to 30 feet. The contact zone of the two sandstones, red and gray, form a shelf. In the softer upper member, the red sandstone zone, shallow rock shelters have been formed.

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[1] The specific location of the Hodges site is Quay County, N½, NE¼, sec. 31, T. 11 N., R. 37 E., New Mexico Principal Meridian.

EXCAVATION AND STRATIGRAPHY

The Hodges site was divided into two areas, A and B, which are two shallow shelters situated on the west side of Plaza Larga Creek. Area A is located some 200 yards north of Area B (pl. 48, *b*).

The excavation of the site can be classified as a salvage job. Despite the elaborate treatment of the artifacts in this text the actual number recovered was small. The most notable fact concerning the artifacts is their diversity of type.

Over three-fourths of Area B was removed by local archeology enthusiasts before the writer's arrival. A single trench was excavated in the remaining deposit of Area B (pl. 50). The stratigraphy of the trench (fig. 29) consisted of a top layer of sterile buff sand overlying an ash lens which rested on a rock fall 6 to 9 inches thick. Directly under the rock fall was a deposit of buff sand liberally mixed with ash, numerous bits of nacreous shells of fresh-water mussels, and artifacts. The deposit trenched was occupied up to the time of the rock fall. The rock fall rests directly upon buff sand containing ash and artifacts. Subsequent occupation was of short duration as is indicated by the small ash lens, devoid of artifacts, directly above the rock fall. All of the fill in the trench in Area B correlates with Judson's No. 2/3 Sand (pl. 49, *a*).

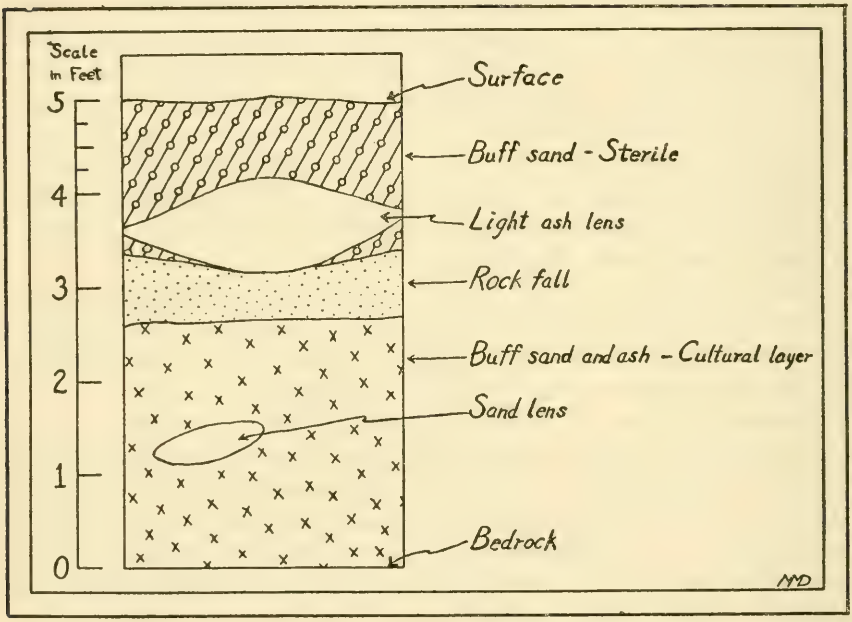

FIGURE 29.—Stratigraphy of the trench excavated in Area B.

About one half of the deposits of Area A (fig. 30) had been removed by erosion. Rock fall consisting of large blocks of sandstone filled the shelter portion of Area A. The excavation of the area consisted of removing the major portion of the shallow deposits immediately in front of the shelter. A trench was excavated at right angles to the main sections to expose the deposits for a short distance under the rock fall.

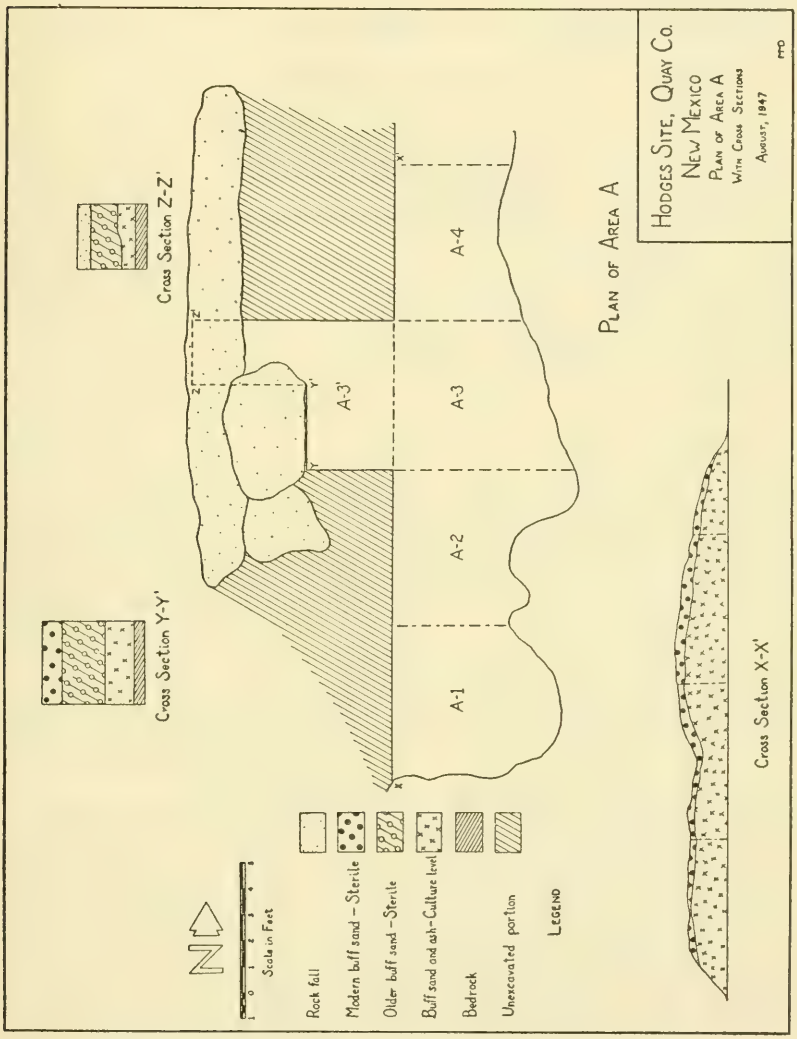
Hodges Site, Quay Co.
New Mexico
Plan of Area A
With Cross Sections
August, 1947
Plan of Area A
Cross Section Z-Z'
Cross Section Y-Y'
Cross Section X-X'
A-1
A-2
A-3
A-3'
A-4
Legend
Rock fall
Modern buff sand – Sterile
Older buff sand – Sterile
Buff sand and ash – Culture level
Bedrock
Unexcavated portion
Scale in Feet
N

FIGURE 30.—Plan of Area A showing excavated portion and stratigraphy.

Stratigraphy exposed under the rock fall in Area A indicated that the shelter was abandoned sometime before the rock fall took place. The rock rested directly upon 12 inches of sterile buff sand, under which was a layer of culture-bearing sand 8 inches in depth.

The stratigraphy of Area A was of a shallow nature in front of the shelter proper (pl. 49, b). The deepest section measured 1 foot 10 inches in depth: 3 inches of sterile buff sand (Judson's Modern Sand) overlying 1 foot 7 inches of buff sand (Judson's No. 2/3 Sand) containing a liberal quantity of ash, numerous fragments of fresh-water mussel shells, and artifacts.

The fill excavated in both areas was screened.

WORKED STONE

PROJECTILE POINTS

Type 1 (*pl. 51*, *d*, *e*, *f*), *5 examples.*—This is the most common type at the Hodges site. It is triangular with straight to convex sides; the base varies from straight to concave. Materials utilized were light chalcedony, quartzite, and a mottled chert. All five of the points were found in rock shelter Area A in a homogeneous deposit having a maximum depth of 2 feet 4 inches.

Projectile points of this type have an exceedingly wide distribution in the southeastern periphery of the southwestern United States. They are reported by Holden from a site in Winkler County, Tex., some 220 miles southeast of the Hodges site (Holden, 1938). The cultures in the vicinity of Carlsbad, N. Mex. (150 miles south of the Hodges site) also show much resemblance to the lithic and general cultural items found at Hodges site. Triangular points were found in the Carlsbad region in midden circles composed of small fragments of limestone, showing evidence of hard firing, piled in circular heaps. The interstices of the heaps are filled with charcoal, ash, broken pottery (Chupadero b/w and Plain Red), bones, and fragmentary fresh-water mussels (Mera, 1938). The total material-culture content of the areas above and in the San Jon area more closely resembles that of the Hodges site than that of all others studied.

Far to the south, in the region of Corpus Christi Bay, Nueces County, Tex., triangular points are found in camp sites several acres in extent. These sites lacked potsherds and tanged points; triangular points alone were found (Martin, 1930). Sayles has designated triangular points as a characteristic type of the Jumano Phase (Sayles, 1935), marked by camp sites made up of sotol pits located in sand hills at the mouths of small tributaries. It extends south of El Paso, in the vicinity of the Rio Grande toward the mouth of the Conchos River of Chihuahua, México, and south along that stream.

On the upper Red River drainage near Henrietta, Tex., in the area of the historic Wichita Indians, Witte mentions one triangular projectile point found in a camp site (Witte, 1935). Triangular points also appear at a historic Wichita site termed "the Spanish Fort," located on the Red River in north central Texas (Witte, 1938).

The writer found, in a survey along the lower Rio Puerco of the East (in New Mexico), small unit sites exhibiting both Socorro b/w and Chupadero b/w pottery and small triangular points made of obsidian. These were smaller and narrower than the ones found at the Hodges site. Kidder found, in the Pueblo of Pecos (a glaze pottery site on the upper Pecos River in New Mexico), 398 triangular points out of a total of 1,190 projectile points and "knives." He divided the triangular points into three categories, depending on whether they had convex, straight, or concave edges (Kidder, 1932).

All of the triangular projectile points mentioned above are similar both in size and in shape to the five found at the Hodges site. Because of its wide distribution in several kinds of sites throughout Texas, eastern New Mexico, and the main Pueblo area in central New Mexico, the type can be of little use as a guide object in determining the specific group or phase of culture to which the sites belong. However, two significant facts do emerge from a study of the distribution of the small triangular point: that it is usually found in conjunction with a pottery horizon, and that it is of a relatively late date in most sites.

Type 2 (*pl. 51*, *h*, *j*), *2 examples.*—This type of projectile point is finely chipped, triangular in shape, with narrow, corner notches and narrow thin barbs; the small expanding triangular bases are smaller in width than the shoulders. The barbs of the two specimens found in Area B are three-fourths the length of the stem. The points were found in the 4-foot level of Area B, a homogeneous ash-stained deposit. Both were made of quartzite.

A subtype (pl. 51, *i*), 2 examples, is triangular in shape, with sides widely notched so that the shoulders take on a flaring shape, and with a small, straight knoblike stem. It is made from a mottled chert not local to the immediate vicinity.

Points very similar to type 2 and its subtype occur in camp sites in the Carlsbad area and east of the Pecos and in large stone middens in the Carlsbad area (Mera, 1938). In addition, distant variations of this type were found in most of the sites mentioned above in tracing the distribution of type 1. However, these variations are characterized by shorter, more flaring horizontal barbs, and straight peglike stems with a more pointed base than is typical of the Hodges type 2 projectile point.

Type 3, *2 examples.*—This type is small, with narrow side notches and a square to slightly rounded base. The two were found in Area A, sec. 3, one of mottled chalcedony, the other of native quartzite.

This third type of point is a Pueblo variety with its main distribution occurring west of the Hodges site in the main Pueblo region.

Side-notched points are characteristic of the Pueblo II–III Period in the Four Corners region, whereas the corner-notched type (type 2) is found in the Basket-Maker III–Pueblo I Period of the same region (Brew, 1946, fig. 172; Morris, 1939, pls. 122, 126). Points of the third type are similar in form to the Pecos arrowhead of Pueblo IV times found on the upper Pecos River, N. Mex. (Kidder, 1932). The writer has seen many such projectile points in sites of the early Glaze IV Period in the Rio Grande Valley near Albuquerque, N. Mex.

One of the two type 3 points from the Hodges site was somewhat erratic, with two notches on each side. It was made of light chalcedony.

Side-notched points are atypical of the central, western, and southern regions of Texas, at least as far as shown by published reports.

The side-notched point has an important bearing on placing the deposits of the Hodges site in the 240-year maximum interval allowed by the presence of brown ware pottery (see Ceramics).

SIDE SCRAPERS

Nineteen side scrapers (pl. 52 *a*, *b*, *d*, *e*, *f*. *g*, *h*) were found in the fill of both areas at the Hodges site. They are simple, from rectangular to oval in shape, having been struck from a core with little regard for specific form. In fact, the form seems to have been determined by the material used. Those of quartzite have a planoconvex shape, usually with more than one working edge (three in two instances). A distinguishing characteristic of the side scrapers is that the edges are retouched to form a low-angled bevel. The scrapers of shale tend to be flat because of the characteristic cleavage of this material. One small scraper was of flint, a foreign material identified as coming from the vicinity of Austin, Tex. One specimen had a double function, a knife on one side and a scraper on the other. The San Jon site had no double-edged tools of this type, but only snub-nosed and side scrapers (Roberts, 1942).

The end of one small scraper (pl. 51, *a*) displays a deeply concave edge. This is similar to one found at the San Jon site which Roberts suggests may have been used to scrape and smooth arrow shafts (Roberts, 1942).

SNUB-NOSED SCRAPERS

One specimen of moss agate (pl. 51, *b*) came from the fill in Area A. It is similar in form and material to those found in the San Jon district (Roberts, 1942). It is a uniface, planoconvex type with the flat side showing no chipping and the curved side having had just enough flakes removed to give the implement its characteristic shape.

ROUGH FLAKE KNIVES

The 28 rough flake knives (pl. 52, *c*, *i*) found throughout the fill in both areas are distinguished from the scrapers by the sharp unshaped edge and the angular form of the flake. Knives of this type are sometimes referred to in the literature as "backed"; that is, a longitudinal ridge was formed along the knife by the removal of two flakes from the core before the knife itself was struck off. The edges were used with no additional chipping or retouching. All were made from the local quartzite.

Both in material and in form, these knives compare rather well with the ones found 12 miles to the southeast at the San Jon site (Roberts, 1942). Renaud found rough flake knives of quartzite similar to those of both of the above sites in caves along the Cimarron River in northeastern New Mexico and western Oklahoma. He attributes them to a primitive form of Basketmaker. However, because of their peripheral position in relation to the classic Basketmaker sites, the Cimarron caves may be chronologically later. No projectile points were found in the caves, despite the plentiful remains of bison and other mammals (Renaud, 1930). Roberts points out that the similarity of the scrapers and rough flake knives of the San Jon region (which geographically includes the Hodges site) to those of the Cimarron Valley caves perhaps indicates that the hunting peoples of the San Jon region tended to rely for a long period of time on implements produced with a minimum of chipping (Roberts, 1942).

REFINED KNIVES

Twelve refined knives (pl. 51, *k*) were found at the Hodges site, seven of quartzite; one, chert; one, obsidian; one, chalcedony; and two, flint. They are distinguished from the rough flake knives by a more refined cutting edge and, in most examples, bifacial chipping. Both sides of the cutting edge were beveled by additional chipping and retouching. These knives vary in shape from planoconvex to convexoconvex.

Two quartzite specimens, both broken blades, came from the 3- and 5-foot levels respectively in Area B. One broken chalcedony blade was found in the fill of Area A. All three conform to the bifacial, broad leaf-shaped type found in the highest levels at San Jon (Roberts, 1942). The chert specimen and one of the flint specimens, both small, thick, elongated bifacial types with rounded ends, are similar in form to those found in caves in the Guadalupe Mountains near Carlsbad and in middens and campsites east of the Pecos River in the same region (Mera, 1938).

The obsidian knife, a notched form, was found imbedded in the weathering surfaces of Area A. It is side-notched and has a broad rounded blade which is greater in width than the shoulders. The edge is worn and dulled from use. This is the only piece of obsidian found at the Hodges site. The main source of this material is in the Jemez Mountain area west of the Rio Grande. An interesting observation is that a portion of one surface of the blade has been ground to eliminate an irregularity difficult to remove by chipping; a technique also noted on the blade of one of the triangular projectile points.

DRILLS

Two drills, both of quartzite, were found at the Hodges site (pl. 51, *c*, *f*). The first is a finely chipped specimen from the 4-foot level of Area B. The shaft is oval in cross section, widening into a horizontally elongated base with a rounded edge. The point tip appears to have been dulled by use.

This drill can be placed in one of the many types found at the Pecos Pueblo by Kidder (Kidder, 1932). It occurs sporadically throughout western and southwestern Texas and throughout the Pueblo region west of the Hodges site.

The second drill came from Area A. Its large rectangular base comprises half of the implement. The other half has been tapered to form a sharp point. The broad basal section presents a firm foundation to hold between the fingers when using the implement.

Mera mentions finding drills in the vicinity of Carlsbad but gives no description or photograph of the type (Mera, 1938).

CHOPPERS

Chopping implements are made by striking large rough flakes from a core; they display a minimum of chipping or retouching. In most specimens a portion of the original surface of the core can be seen on some part of the chopper. They are differentiated from the rough flake knives described above by their heavy edges and general massiveness. The varied sizes and shapes are probably merely the result of random selection; that is, any large flake or core was used which had a long sloping bevel on each side to produce a heavy edge. In some implements these fortuitously beveled edges were retouched by chipping; in others the retouching was done on one side of the edge only, producing serrations.

The nine choppers (pl. 53, *d–g*) found in Areas A and B were made of a local quartzite and display the same general characteristics as the choppers described and illustrated by Roberts for the San Jon area (Roberts, 1942).

HAMMERSTONES

Stream-worn stones of quartzite, selected for size and shape to fit the hand, were used as hammerstones (pl. 53, *b*). The ends show a pecked surface which characterizes them as implements. They were probably used to knock flakes from cores, to pit sandstone slabs, for cracking seeds, and crushing bones. One specimen, oval in shape, was found in the 4-foot level of Area B, and one, cylindrical in shape, came from a 2-foot level of Area A. These specimens compare well with those found at the San Jon site (Roberts, 1942).

MANOS

Four manos (pl. 53, *a*, *c*), of the type frequently referred to as "one-handed," were found in the 3- and 4-foot levels of Area B. All are small stream-worn boulders of triassic sandstone. One of the whole specimens is elongated with two convex grinding facets; the other is oval in outline with a single flat grinding surface and shows some pecking around the edges, perhaps indicating use as a hammer for crushing occasional hard seeds that could not be reduced to meal by ordinary rubbing means.

These manos are similar to those found by Roberts in the upper levels of the San Jon sites (Roberts, 1942). The same type was found by Mera in campsites in the vicinity of Carlsbad and east of the Pecos; none, however, occurred in the midden circle sites in that area, where the mano and metate were replaced by the bedrock mortar and pestle (Mera, 1938)—a phenomenon also true of many sites in the Panhandle and the southwestern part of Texas. In other sites the metate and mortar have been used in conjunction, as is true of the Hodges site. The two implements are equally effective for the grinding of seeds and also, if the practice was current at the time, for grinding dried meat.

METATES

One half of a single specimen was found at the Hodges site, in the 5-foot level of Area B. The size, if my reconstruction is correct, was about 1 foot long and 8 inches wide. It was made of a square tabular slab of soft sandstone, the edges of which were dressed by shaping the under and upper sides. The shallow, oval grinding surface shows some evidence of pecking.

Metates of the type found at the Hodges site occur sporadically through the Texas Panhandle and eastern New Mexico. At San Jon, Roberts found two types, one like the specimen described above and the other a narrow, troughlike stone, boat-shaped in design. These two types of metates probably account for the two kinds of manos found in that region. The circular forms could have been used with the oval type of metate, while the long oval forms of manos could have served in the trough type metate (Roberts, 1942).

MORTARS

Seven bedrock mortars are located between Areas A and B in the sandstone rock which forms the roof for the rock shelters. They range from 5 to 7 inches in diameter and from 9 to 12 inches in depth. Some of them are filled with earth washed in from the surrounding area. An interesting discussion of the mortars in relation to geological phenomena will be found in the accompanying section by Judson p. 291).

Mortars are a characteristic trait of the stone midden, campsite, and rock-shelter sites in the Panhandle of Texas and in southeastern New Mexico. They are sometimes accompanied by metates but the actual numbers of mortars and metates in any given site are seldom, if ever, reported. There is a scarcity of stone pestles of any shape or form in these sites; perhaps wooden pestles were utilized in these mortars.

FAUNAL MATERIAL

ANIMAL BONES

The animal bones were few and in only fair condition of preservation. Even the heavy, thick bison bones were fragmentary, as they had been splintered by the inhabitants of the rock shelters. Miss Barbara Lawrence, of the Museum of Comparative Zoology, Harvard University, tentatively identified the bones as follows:

Area A: Prairie dog, cottontail rabbit, bird, probable pronghorn antelope, and bison.
Area B: Jack rabbit, prairie dog, cottontail rabbit, and bison.

One of the large splinters of bone, probably bison, shows marks of having been struck by a sharp implement, possibly a chopper. The area around the indentation shows a shattered surface.

The antelope and bison are not present in the immediate area at the present time, but the other animals are still found. Roberts (1942) gives an excellent list of mammals of archeological interest in the San Jon area, with information as to their presence or absence there in prehistoric times.

SHELLS

The presence of fresh-water mussels is a little emphasized trait in the sites of eastern New Mexico. Their abundance in some sites necessitates the consideration of their use as food.

The deposits of both Areas A and B, from the top of the cultural deposits to the lowest portion, were peppered throughout with numerous fragments of a variety of fresh-water mussel. This has been identified by Henry Vander Schalie of the University of Michigan as *Uniomerus tetralasmus* Say (pl. 54). One whole specimen, found in the 3-foot level of Area B, shows evidence of having been pried open with a stone or stick.

Renaud found fresh-water shells in sites along the Cimarron River in the northeast corner of New Mexico (Renaud, 1930). Mera found the midden deposits east of Carlsbad interspersed with shell fragments and, in addition, 30 or 40 single valves in a burial. These were identified as a species now found in the Pecos River (Mera, 1938). The greatest numbers of these shells seem to appear in the Carlsbad section of the Pecos River. Fragments of fresh-water mussels are noted in the refuse of Brown ware sites excavated by Jennings on the Penasco Blanco River (Jennings, 1940). Kidder reports hundreds of fragments of fresh-water shells which were probably cut for the manufacture of beads and pendants. These are of *Unio* sp. and were "probably local" (Kidder, 1932).

As far as the writer can ascertain, these mussels are rare in the region of the upper Pecos. Therefore, it is possible that the presence of their shells in such great numbers in sites of that area may indicate that they were important as trade material throughout eastern New Mexico. They may also have been of ritual importance to some groups, as indicated by the large numbers of them found by Mera in a burial.

On the surface of Area A, a small rectangular nacreous shell pendant was found. It was perforated by a single hole at one end. As it was in a weathered condition any other shaping was impossible to discern.

CERAMICS

Several specimens of Plain Brown ware were found in the deposits of Area A. A single sherd of Plain Red ware was found lying in a previously excavated portion of Area B. No other types of pottery appeared at the Hodges site.

The Red ware is a variation of the Brown ware and was found in sites along the Penasco Blanco River by Jennings (1940). The Plain Brown ware has a hard brown paste with a great deal of sand temper. The interior is unfinished and the exterior appears to have a polished floated slip. The polishing marks are very noticeable.

The presence of this Brown ware is very important as it is a significant type originative south of the Hodges site and can be correlated to some degree with other types (Chupadero b/w and Mimbres b/w) of known date from the west.

The Hodges site lies in the most northern section of the known Brown ware province, the center of which is the Tularosa Basin and surrounding area. This important ware extends over most of New Mexico east of the Rio Grande and south of a line running east, from the confluence of the Rio Puerco of the East with the Rio Grande, to and including Tucumcari, New Mexico, and the San Jon area (Mera, 1943). This does not, however, give the complete extent of the ware, as its influence is felt in the camp and midden sites of western Texas (Smith, 1936).

In discussing the dating of this Brown ware it is deemed necessary at this point to review the archeology of three Brown ware sites located on the Penasco Blanco River, some 180 miles southwest of the Hodges site, as reported by Jennings. The inhabitants of those villages practiced maize agriculture, made pottery, and lived in a jacal type of dwelling. Jennings, in his excavation of the sites, distinguished two levels. The lower level contained some 92 percent of Brown ware and 5.7 percent of El Paso Polychrome. The upper level is reversed, with 89.2 percent of El Paso Polychrome and only 7.8 percent of Brown ware. An estimated date of A. D. 1150–1300 is given to cover the occupancy of the sites. These dates were arrived at by cross dating with other dated pottery types found in the site (Jennings, 1940). This writer believes, however, that Jennings' dating is a little early, for he gives little attention to a possible time lag in the introduction of Black-and-white wares from the West.

Small amounts of Brown ware probably related to that in the Penasco Blanco sites appear in Mera's campsites and midden circle sites east of Carlsbad. Perhaps these peripheral sites were of hunting-gathering peoples who traded with or possibly raided their agricultural neighbors and obtained these wares. The actual content of Mera's sites indicates that they were occupied later than the sites of the Penasco Blanco area, if Jennings' dates for the latter are held to.

In the San Jon region, Roberts found both Brown ware and Chupadero b/w, by means of which he tentatively dated the upper horizon as late fourteenth or early fifteenth century. As the stone artifacts of that San Jon horizon are most similar to those of the Hodges site, and as the Brown ware appears in both, the writer feels that the Hodges site should be given the same tentative date, late fourteenth or early fifteenth century.

CONCLUSIONS

The culture-bearing strata of both Area A and Area B of the Hodges site are homogeneous. The absence of stratigraphical disconformities indicates that the areas were occupied continously, though for a relatively short period of time. In giving to this period a more or less definite date, it has been found necessary to rely almost entirely on the rather scanty ceramic evidence, for the following reasons:

(1) The refined artifacts (projectile points, refined knives, snub-nosed scrapers, and drills) are typologically similar to those of many sites and periods throughout the Southwest. However, in the Hodges site they occurred throughout the culture-bearing strata and consequently no implications can be made as to their relative age, except that it is late.

(2) Rough artifacts (side scrapers, rough flake knives, shoppers, and hammerstones) are equally useless in determining the chronological position of the Hodges site, for they too commonly formed the basic "tool kit" in North American cultures from earliest times into the historic period.

(3) The bedrock mortars are comparable to those found in late midden and camp sites extending from southwest of the Hodges site into western Texas. However, they cannot definitely be attributed to the inhabitants of the rock shelter.

The Brown pottery in the Hodges site can be traced several hundred miles south to its center in the Tularosa Basin and surrounding area. The Hodges site is at the northernmost periphery of this area. The ware, in conjunction with artifacts listed in this report, is important in dating the Hodges site. The same assemblage of material occurs, at least in part, in sites to the south and in the San Jon site to the east, which display Brown ware, Chupadero b/w, and other types tentatively dating from the late fourteenth or early fifteenth century. The use of Brown ware and the associated artifacts probably continued into the middle of the sixteenth century.

Therefore, the cultural implications of the material found are that the Hodges site was probably occupied fairly continuously from the late fourteenth or early fifteenth century to the middle sixteenth century by a group (or culturally related groups) of simple hunting-gathering people. Their culture appears to have been similar to those reported from the area bounded by Carlsbad to the south, the Cimarron River to the north, and the Rio Grande to the west, with an as yet undetermined eastern periphery. A full understanding of the pre-Spanish and historic connections of these groups, and their relations with their pottery-making, agricultural neighbors to the south and west, must await more attention from archeologists than has hitherto been given to this and similar problems involving much the same time span throughout the Southwest.

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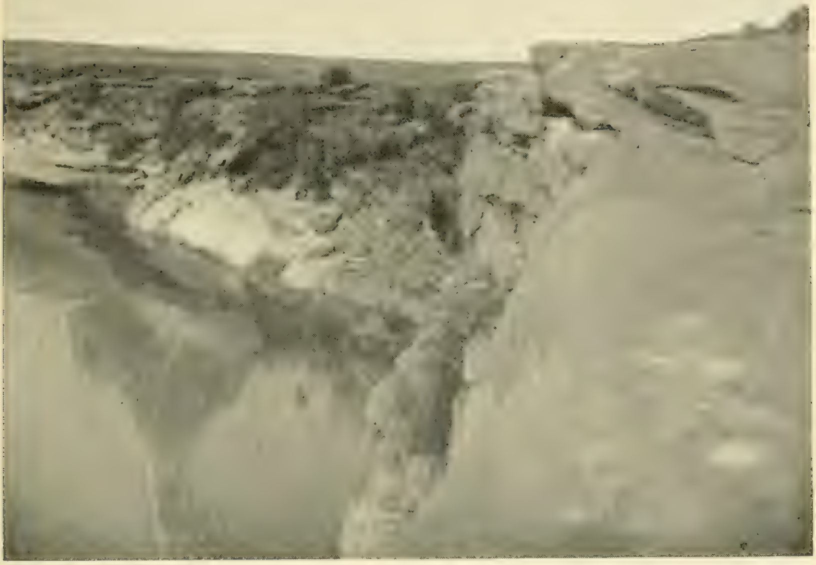
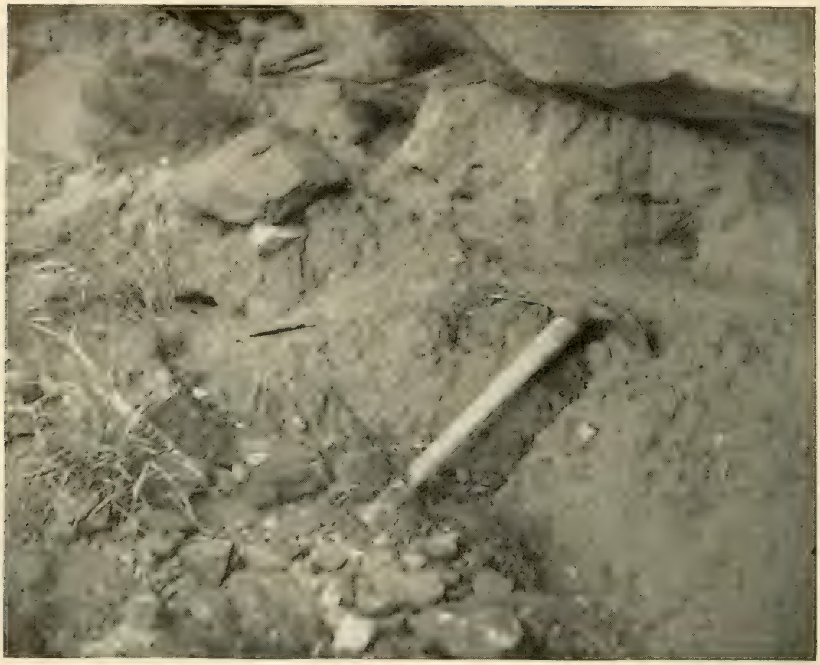
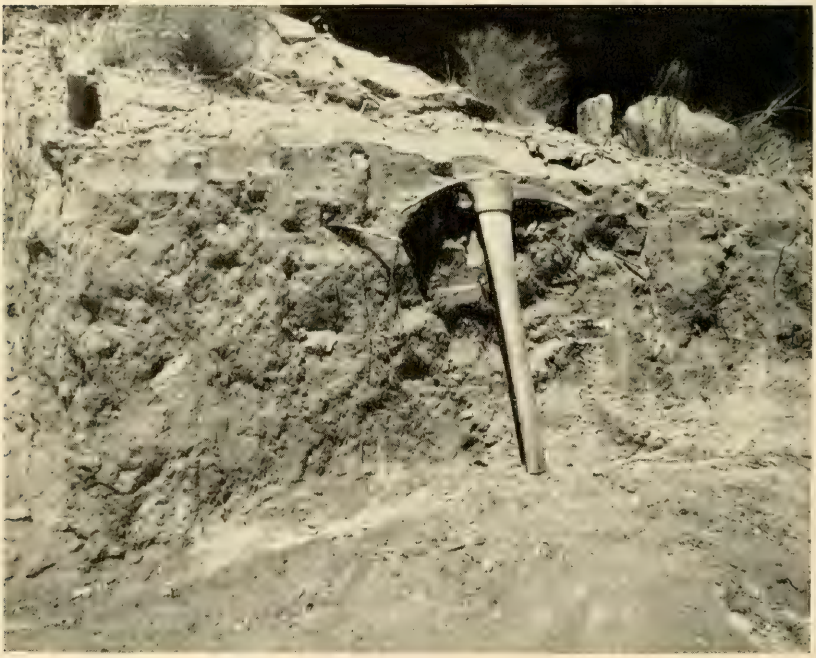
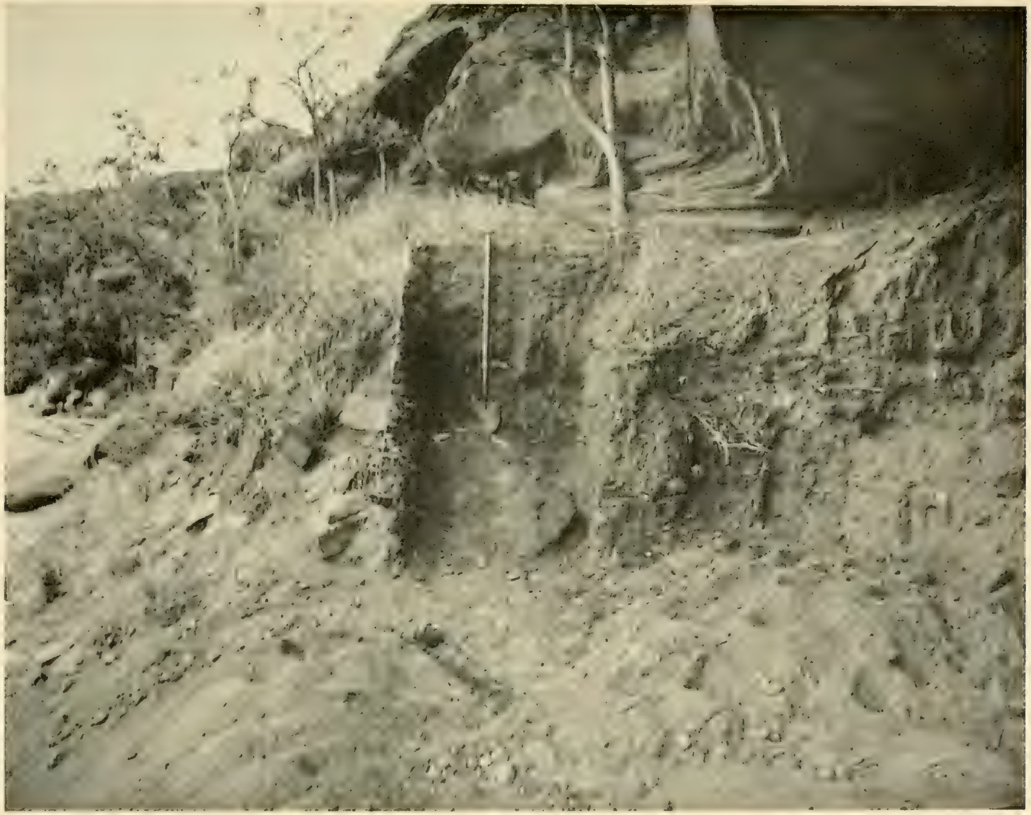


a, General view of the Hodges site. Area A is located at the far left edge of the picture. Area B is located at the right center. *b*, Area A at the beginning of excavation. Note rock fall inside the shelter behind the figure and screen.

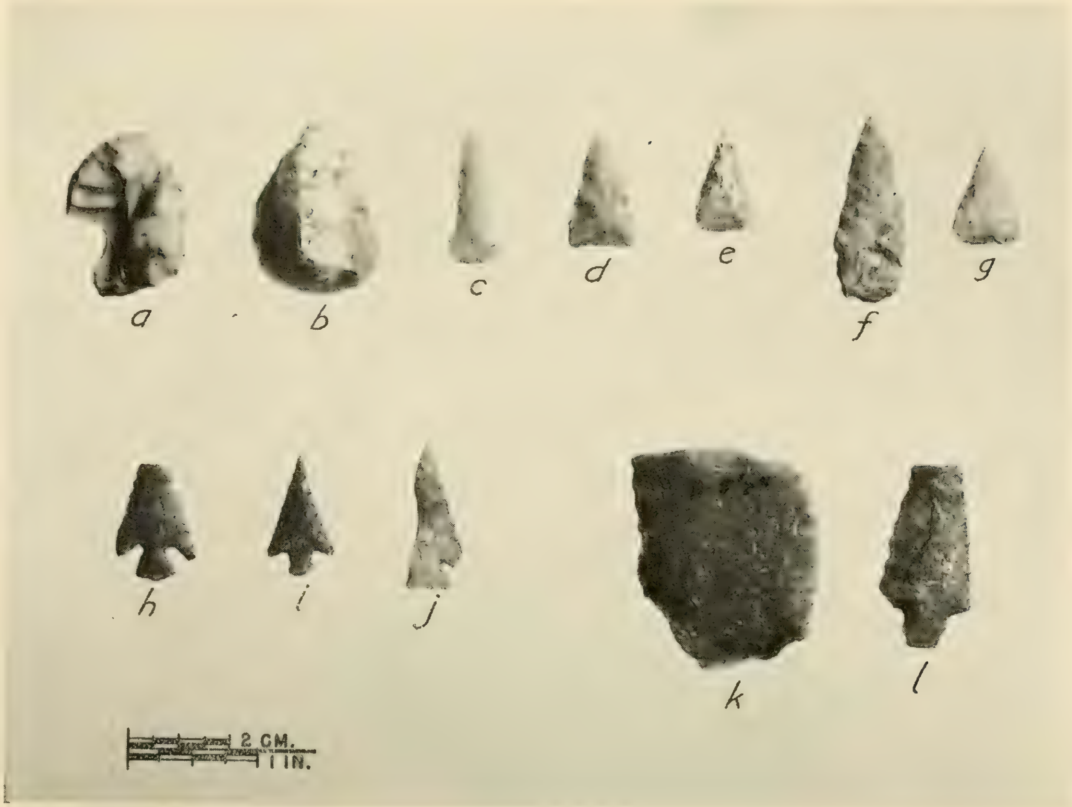




a, Artifacts eroding out of the No. 2/3 fill under the rock fall in the shelter of Area A. Pencil points to a notched obsidian knife. Point of mattock points to a rough flake knife. *b*, Stratigraphy of section A–4, Area A.



Trench in the remaining fill of Area B.


a
b
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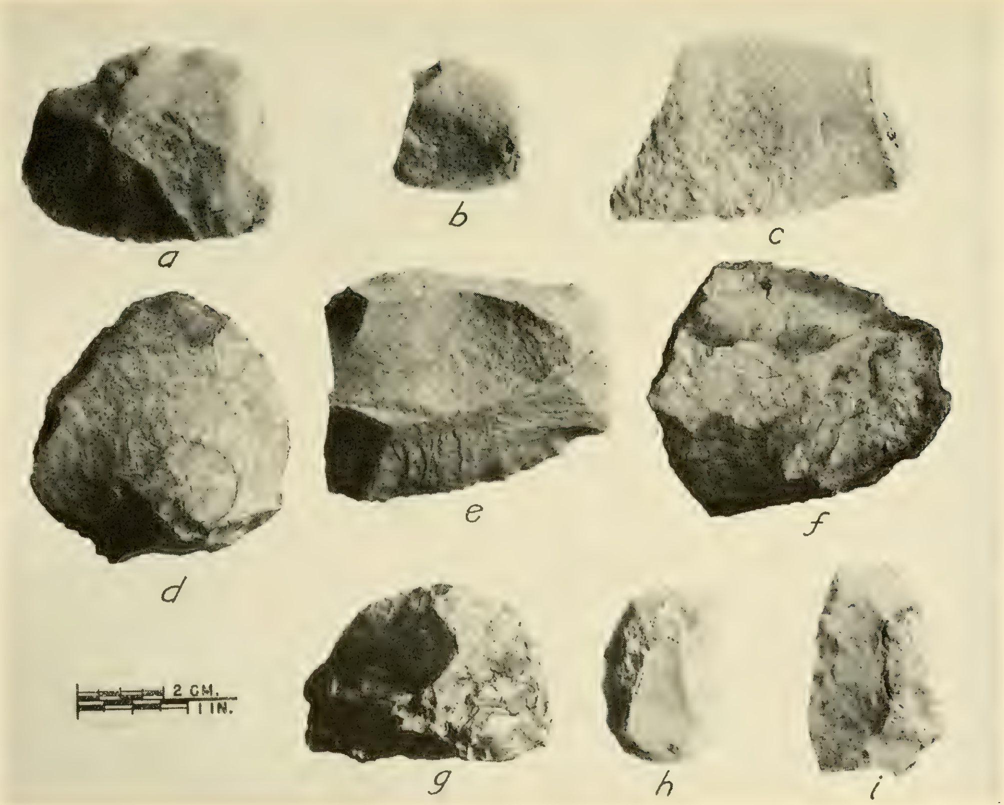
l
2 CM.
1 IN.

Projectile points, drills, refined knives, and snub-nosed scraper.


a
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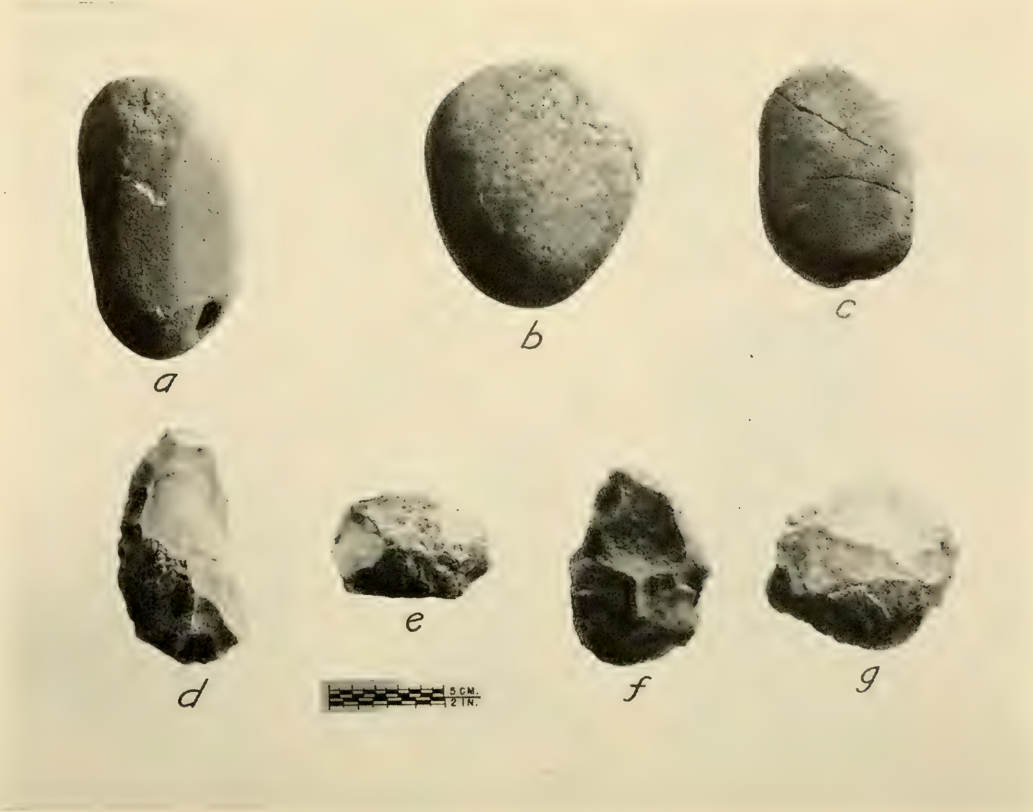
2 CM.
1 IN.

Scrapers and rough flake knives.


a
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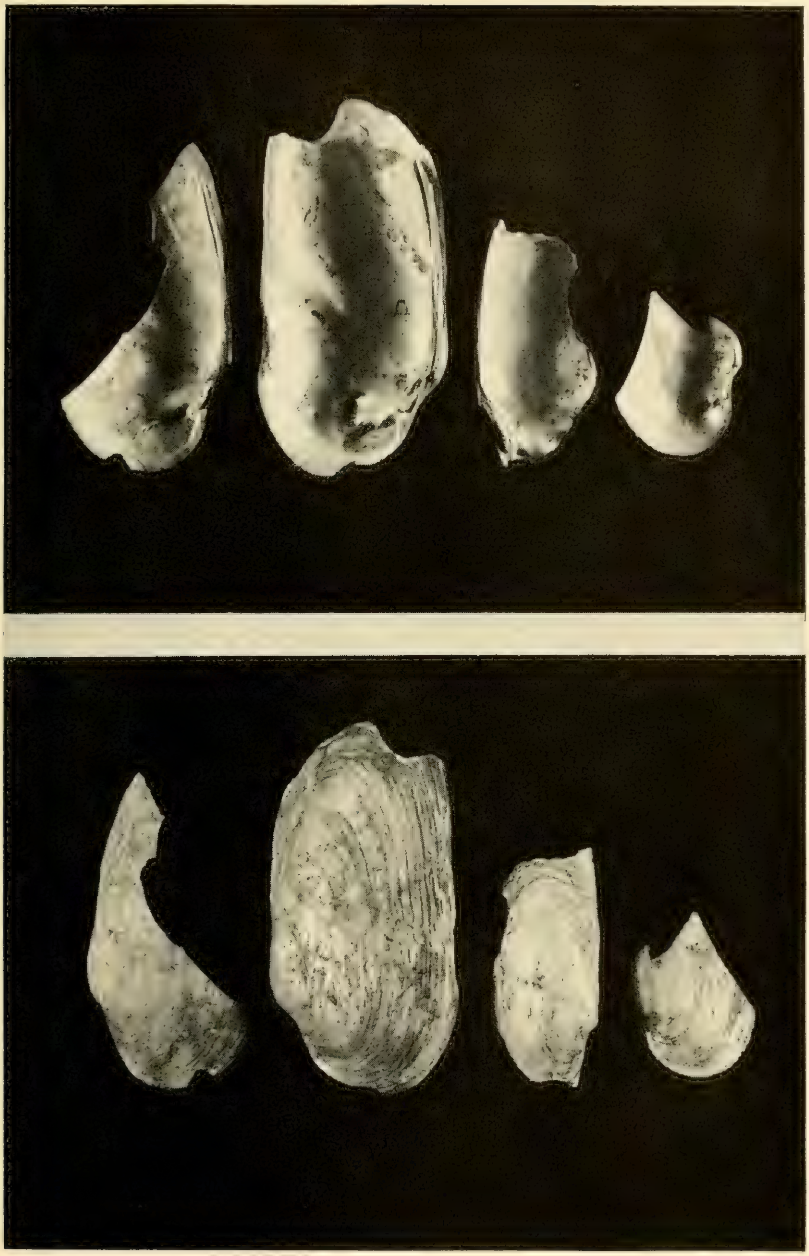
5 CM.
2 IN.

Manos, hammerstone, and choppers.



Fresh-water shells, *Unimerus tetralasmus* Say.

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The Hodges Site

II. Geology of the Hodges Site, Quay County, New Mexico

By SHELDON JUDSON

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CONTENTS

PAGE
Introduction 289
Physical setting 289
The general Pleistocene sequence 292
The sequence at the site 294
  The lower erosion surface 295
  The alluvial sequence 295
    No. 2 Fill 295
    No. 2/3 Sand 295
    No. 3 Fill 296
    Modern sand 296
General considerations and conclusions 297
Literature cited 301

ILLUSTRATIONS

FIGURES

31. Index map showing location of the Hodges and San Jon sites 290
32. Block diagram to show the salient features of the Hodges site 291
33. Generalized section to show the relation of the two erosion surfaces, the inner canyons, and the alluvial formations 292
34. Bar graph to illustrate the relative duration of the various events in the "Alluvial Chronology" 294
35. Diagram to show the relation of the sand (No. 2/3 sand) containing the culture horizon to the other deposits at the Hodges site 296

GEOLOGY OF THE HODGES SITE, QUAY COUNTY, NEW MEXICO

By Sheldon Judson

INTRODUCTION

The archeology of the Hodges site occupies a critical position in the "Alluvial Chronology" of eastern New Mexico. The study of the geologic antiquity of the nearby San Jon, N. Mex., site (Roberts, 1942) begun by the writer in the summer of 1941 demanded the development of this chronology.[1] Moreover the Hodges site presented ideal conditions for cooperation between the archeologist and the geologist. At this place occur bodies of sandy silts representing a known period of wind activity of wide geographic extent and related to a well-known geologic sequence. These deposits contain cultural material and thus appeared susceptible to relatively precise dating. In addition, the cultural objects promised to throw some light on the peoples living in this section of New Mexico at this particular time. The results of the study presented in this report and the companion paper by Dick would seem to justify preliminary expectations.

The site was first seen by the writer in September 1942, in the company of the late Dr. Kirk Bryan, of Harvard University, and Dr. Franklin T. McCann, of Alabama Polytechnic Institute. It was not until August 1947, after a reexamination of the site by Bryan and Judson, that excavation was possible. The companion paper by Dick presents the archeologic results of the investigation. Judson visited the site on two occasions during its excavation.

PHYSICAL SETTING

The site consists of two rock shelters in a sandstone cliff on the west bank of the Plaza Larga Creek, one of the tributaries of the Canadian

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[1] The study, of which this paper is a semi-independent part, was undertaken in conjunction with the excavation of the San Jon site. The continuing interest, cooperation and assistance of Dr. Frank H. H. Roberts, Jr., Smithsonian Institution, has greatly facilitated the work of the geologist in both field and office. Financial support was provided by the Smithsonian. The late Dr. Kirk Bryan, Harvard University, supervised the field work and has criticized the manuscript for this paper.

River in the so-called Canadian Valley. It lies in the N½, NE¼, sec. 31, T. 11 N., R. 37 E., N. M. Pr. M. and B. and is 2¼ miles south of United States Highway 66, 1¼ miles east of New Mexico Highway 18 and 8 miles south and east of Tucumcari (fig. 31).

The Plaza Larga is a steep-sided, sandy-bottomed, intermittent stream which carries water only during and immediately after local rains. It is cut in comparatively soft clayey sand and silt of previously deposited alluvium, but locally, as at the site, is bordered by rock cliffs. The introduction of irrigation water into the area[2] already tends to increase the period of flow and to keep the stream bed moist for considerable lengths of time. Hence, grass, trees, and bushes will grow and for this reason the regime of the stream will be changed and some aggradation of its channel will be induced. Thus the irrigation project will very probably effect an artificial and local change in the stream which will reverse the present trend.

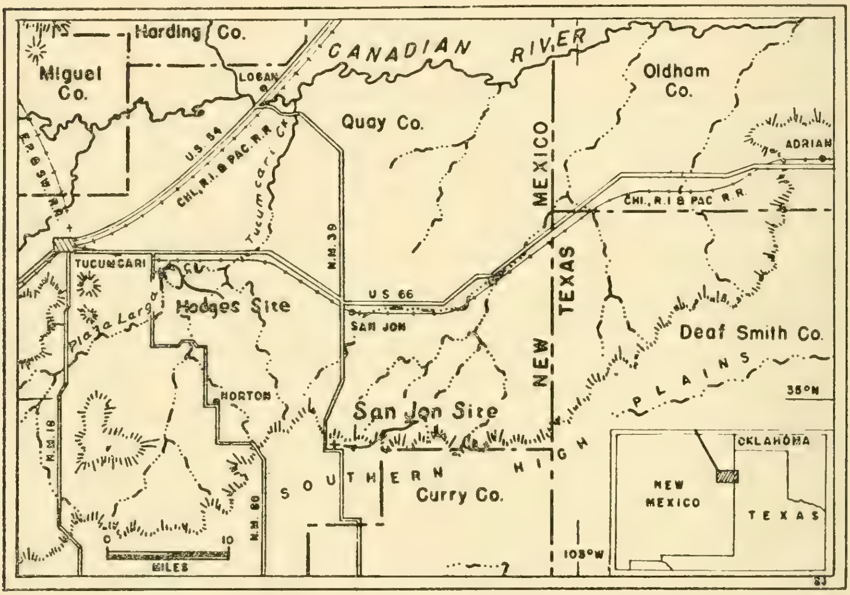
Harding Co.
Miguel Co.
CANADIAN RIVER
LOGAN
Oldham Co.
Quay Co.
U.S. 54
CHI., R.I. & PAC. R.R.
Tucumcari Cr.
E.P. & S.W. R.R.
ADRIAN
NEW MEXICO
TEXAS
CHI., R.I. & PAC. R.R.
N.M. 39
TUCUMCARI
Plaza Larga
Hodges Site
US 66
SAN JON
Deaf Smith Co.
PLAINS
35°N
HORTON
San Jon Site
N.M. 18
SOUTHERN HIGH
Curry Co.
OKLAHOMA
NEW MEXICO
TEXAS
0
10
MILES
103°W

FIGURE 31.—Index map showing location of the Hodges and San Jon sites.

The Chinle formation, of Triassic age, forms the floor of the valley plains of the Canadian River throughout this section of New Mexico. It is predominately brick-red in color, but locally green to buff. It consists of an upper member, the Redondo (Dobrovolny, Summerson, and Bates, 1946) characterized by thin-bedded, fissile shale, and a lower unnamed member, composed chiefly of massive, cross-bedded sandstone.

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[2] The Arch Hurley Conservancy District, centering around Tucumcari, will eventually consist of 45,000 acres of irrigated land. Water is being drawn from the lake behind Conchas Dam, just below the confluence of the Conchas and Canadian Rivers, 30 miles northwest of Tucumcari. The dam was built before the war by the U. S. Army Engineers as a flood control project.

The block diagram of figure 32 pictures the salient features of the Hodges site. The two shelters are shallow caves formed in the sandstone of the lower member of the Chinle formation. They are separated from each other by about 150 feet of near-vertical standstone cliffs, 25 to 30 feet in height. The floor of the northern shelter (Dick's Area B) lies 10 feet above the modern grade of Plaza Larga, and the floor of the southern shelter (Dick's Area A) is 18 feet above this local datum. The cultural material is contained within a deposit of sandy silt laid down in the shelters as wind-borne dust during and after their occupation.

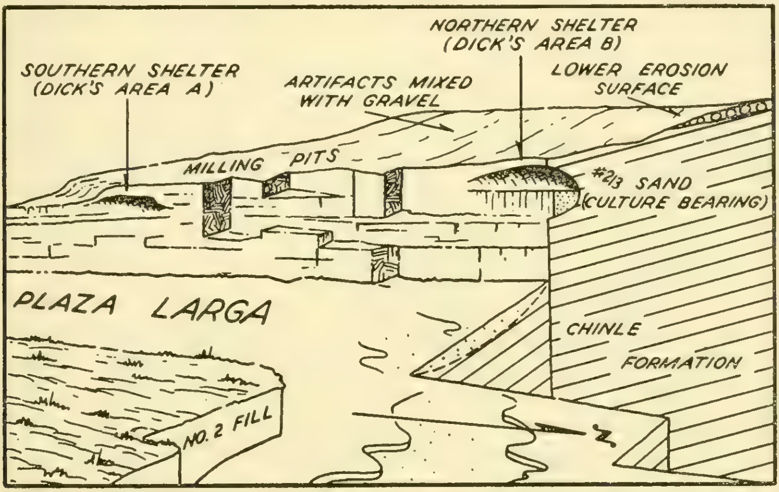


Figure 32.—Block diagram to show the salient features of the Hodges site.

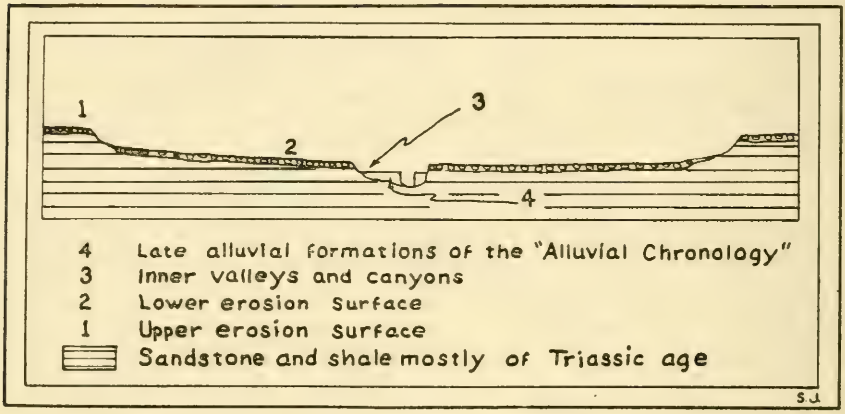
In addition to these two shelters the culture-bearing sand extends 75 feet southward from the southern shelter along a rock bench continuous with the shelter floor. Furthermore, artifacts are found mixed with gravel along the high surface reaching back from the lip of the cliff in which the shelters are located.

In places near the cliff edge, where the gravel has been stripped away, milling pits have been sunk into the sandstone ledge. Their position presents an interesting correlation between a minor geologic feature and human activity. The Triassic sandstone is criss-crossed by polygonal dessication cracks two to three feet in maximum dimension. The milling pits have, almost without exception, been sunk along these cracks or at their points of intersection. These weaknesses in the rock obviously afforded the easiest places for pit construction.

THE GENERAL PLEISTOCENE[3] SEQUENCE

South of the site the broad valley of the Canadian butts abruptly against the northern escarpment of the Llano Estacado or Southern High Plains. The valley, in places 50 miles wide, was cut during the Pleistocene epoch by the Canadian River and its tributaries. The detailed record of valley development is fragmentary, however, and includes only the most recent events in an otherwise long time interval.

Two gravel-covered surfaces, cut chiefly in the Triassic rocks, form the floor of most of the valley as shown in figure 33. The higher of these two surfaces, approximately 50 feet above the modern stream grades, is best preserved along the headwater reaches of the tributaries to the Canadian. It represents a long period of plantation during which the Canadian River and its tributaries were stabilized at a level much higher than the present. The gravel veneer on this bedrock surface was deposited by these streams during the final stages of erosion.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2
3
4
4 Late alluvial formations of the "Alluvial Chronology"
3 Inner valleys and canyons
2 Lower erosion surface
1 Upper erosion surface
Sandstone and shale mostly of Triassic age
S.J.

FIGURE 33.—Generalized section to show the relation of the two erosion surfaces, the inner canyons, and the alluvial formations.

The second and lower surface is approximately 30 feet above modern stream grade. It has been widely and well developed at the expense of the higher surface. This surface marks a second planation when the local streams were graded to a lower level than that of the higher surface. The capping gravels represent the closing period of this event. Both surfaces are mantled by more recent wind-blown sand and by alluvium.

Comparatively narrow inner valleys and canyons have been cut into the lower of the two surfaces and form the modern bedrock grades.

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[3] Pleistocene is here used to include all time which has elapsed since the end of the Pliocene. Such terms as "Recent" or "Post-glacial" are used only in an informal and local sense. (See Flint, 1947, p. 209.)

The Canadian River itself flows in a bedrock gorge incised in places to a depth of 200 feet below the general grade of these tributary valleys. Figure 33 illustrates the relations of the modern bedrock channels of the tributary of the Canadian to the remnants of the higher and lower surfaces.

The formation of the erosion surfaces and the later stream incision just described were followed by various events of deposition and erosion which are of intimate concern to the archeologist. Although unspectacular when viewed against the immense scope of geologic time these brief events, mere incidents in earth history, coincide with the human occupation of the valley from the day of the Paleo-Indian to the present. The changes from alluviation of the valleys to erosion, and then the reverse, form a sequence of events which undoubtedly had a profound effect on human activity. Cultural patterns must have been influenced in ways as yet but dimly perceived and appreciated.

The sequence of these events is deceptively simple. It is this very simplicity, this monotonous, rhythmic repetition which dulls the mind's retentiveness. Yet retention is important. The sequence is widespread not only in eastern New Mexico but throughout the Southwest. When man and his activity can be related to the sequence we have an unparalleled stratigraphic tool to aid in the determination of the relative and, in some cases, exact ages of the peoples concerned and the environment in which they lived.

The sequence, the "Alluvial Chronology," is basically an alternation of stream alluviation with stream cutting. During certain periods in the immediate geologic past the streams of the Southwest have filled their bedrock channels with silt, sand, and gravel. When the filling was complete the alluvial flood plains in some valleys were marked by shallow stream channels, whereas in others they were grassy and smooth, marked only by quiet water holes, the *charcos* of Spanish days. These intervals of alluviation are separated one from the other by periods of arroyo cutting, a process so characteristic of the area today. Concurrently with the incision of channels strong winds carrying additional eolian material from the dry stream beds reactivated old sand dune areas.

The sequence, discussed in general terms above, may be outlined briefly as suggested in the following tabulation. The tabulation in one sense is misleading. It suggests that the events have an approximate equality in time, i. e., that each had the same duration as any other. This is not true. Exact durations cannot be assigned to all the incidents but in general the earlier the event the longer it lasted. Thus the bar graph in figure 34 indicates in a very crude fashion these time relationships. The higher the bar the greater the time involved in each incident.

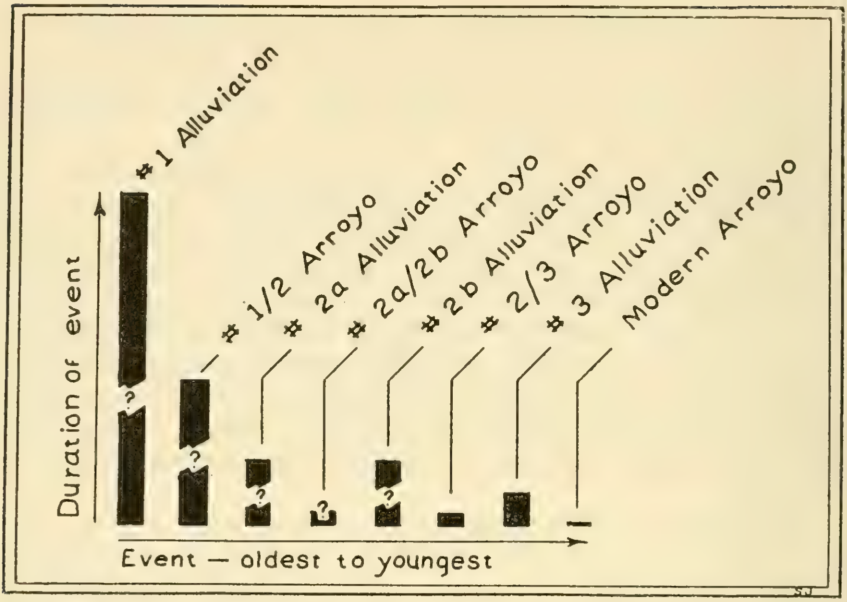

FIGURE 34.—Bar graph to illustrate the relative duration of the various events in the "Alluvial Chronology."

The Alluvial Chronology

(Events and deposits are listed in order from the youngest to the oldest.)

Event	*Deposit*	
Arroyo cutting and sand-dune formation	Modern sand and dunes.	
Stream alluviation	No. 3 Fill (given various local names)	
Arroyo cutting and sand-dune formation	No. 2/3 sand and dunes.	
Stream alluviation	No. 2b Fill	(Undifferentiated in many places and given local names).
Arroyo cutting and sand movement	No. 2a/2b sand	
Stream alluviation	No. 2a Fill	
Arroyo cutting and sand-dune formation	No. 1/2 sand and dunes.	
Stream alluviation	No. 1 Fill (contains extinct animals and is given various local names).	

THE SEQUENCE AT THE SITE

Because of the vagaries of deposition and preservation, the complete alluvial sequence is seldom displayed in any one place. But throughout a given drainage basin the sequence can be pieced together from scattered exposures of stratigraphically overlapping sections. Thus it is not surprising that the sequence at the site is incomplete. In this vicinity the No. 1 Fill, part of the No. 2 Fill, and the intervening sand deposits are missing, as is the highest erosion surface. These can be found at other places within the drainage of the Plaza Larga, more particularly near the base of the escarpment of the Llano Estacado or around outlying mesas, once integral parts of the Llano. A description of the sequence at the site is presented below.

THE LOWER EROSION SURFACE

The higher erosion surface is not preserved in the vicinity of the site but the lower surface is widely developed and here forms the major part of the valley floor. Through it the Plaza Larga has cut its modern bedrock grade in a relatively narrow channel about 30 feet deep.

THE ALLUVIAL SEQUENCE

Within this bedrock channel a partial record of alluviation, arroyo cutting, and eolian deposition is recorded. Part of the No. 2 Fill, the No. 3 Fill, intervening wind-borne material, and the modern wind-borne deposits are present. Thus only a part of the "Alluvial Chronology" need be discussed.

NO. 2 FILL

This is a red sandy alluvium exhibiting a rudimentary jointing system. It is fairly compact but can be crumbled between the fingers with some difficulty. Lime-filled tubules and films of lime along the joint planes are characteristic. Toward its upper limit it contains a dark humic zone. In the vicinity of the site the alluvium reaches a maximum thickness of 8 feet, and forms a small terrace along the stream. Elsewhere in the valley this formation is divisible into two units on the basis of two humic zones, separated in places by erosion and concurrent wind-deposited sands. The No. 2 Fill here described is believed to represent the upper of these two units, Fill No. 2 A of figure 34 and table 1.

NO. 2/3 SAND

A period of erosion or channel cutting similar to that of today followed the deposition of the No. 2 Fill. Wind activity accompanied this trenching and at favorable localities eolian deposits collected. This material is a reddish, well-sorted, fine-grained silt or sandy-silt resembling a loess in texture. Over 50 percent of the deposit has a grade size less than 0.062 mm. It crumbles easily but nevertheless, in natural and artificial banks, stands with a vertical wall. It varies in thickness from a few inches to 7 feet. This is the deposit which entombs the cultural material within the two shelters and also on the rock bench continuous with the floor of the southern shelter. The shelters trapped the sandy-silt as the wind carried it from the dry arroyo bottom. The sand can be traced south from the southern

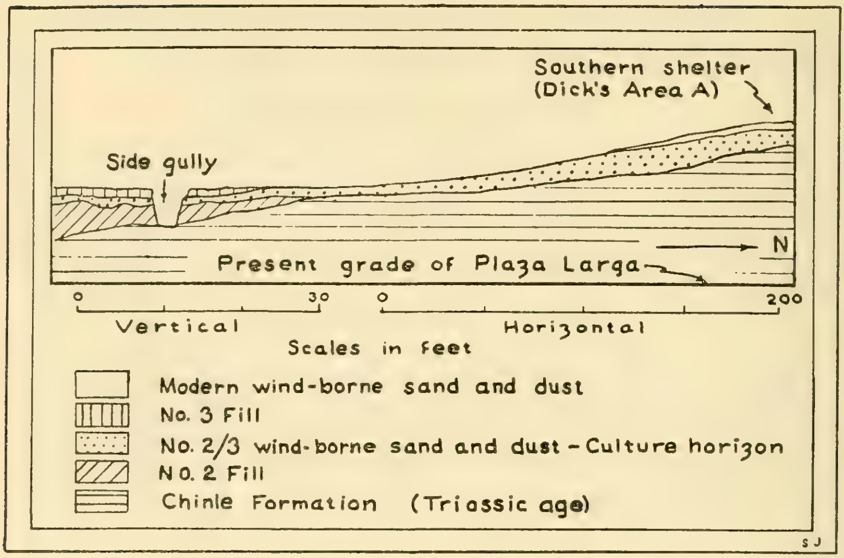
Southern shelter
(Dick's Area A)
Side gully
N
Present grade of Plaza Larga
0
30
0
200
Vertical
Horizontal
Scales in feet
Modern wind-borne sand and dust
No. 3 Fill
No. 2/3 wind-borne sand and dust - Culture horizon
No. 2 Fill
Chinle Formation (Triassic age)
SJ

FIGURE 35.—Diagram to show the relation of the sand (No. 2/3 sand) containing the culture horizon to the other deposits at the Hodges site.

shelter to a point where it is interbedded with alluvium and separates the Nos. 2 and 3 Fills as shown in figure 35.

NO. 3 FILL

Following the preceding erosion period the Plaza Larga began the aggradation of its channel and the No. 3 Fill was laid down. This is a gray, loose, friable alluvium containing little or no lime. In this vicinity it does not exceed 2 feet in thickness. The great bulk of it has been removed in the modern channel trenching but thin remnants of it mantle the stream banks and overlie the No. 2 Fill. In some places the two fills are separated by a few inches of the No. 2/3 Sand.

MODERN SAND

About 1900 the Plaza Larga began to cut its present channel. In so doing it scoured out much of the No. 3 Fill until it again reached its bedrock grade. With this cutting came another period of wind activity and concurrent eolian deposition. At the site the sand forms a discontinuous cover ranging from a thin film up to 6 inches. It is a gray, loose, sandy to loessic deposit. It is best developed within the shelters overlying the preceding wind-blown sand. Elsewhere in the area active sand dunes of considerable size and destructiveness mark this period of wind activity, and also the deep red scars of the modern arroyos testify to the effectiveness of stream erosion.

GENERAL CONSIDERATIONS AND CONCLUSIONS

Several conditions must be satisfied before the geologic method can successfully be applied to an archeologic site. Bryan and Ray (1940) list these conditions as follows: (1) A well-defined culture-bearing horizon related to a definite geologic event; (2) a local sequence into which this event may be fitted; (3) a general sequence of wide geographic extent which includes this local sequence; and which (4) can be related to an absolute time scale.

The Hodges site well illustrates the importance of satisfying the conditions outlined above. The open site above and behind the shelters defeats the geologist before he begins. The artifacts found mixed with the gravels of the lower erosion surface, can hardly be considered contemporary with that relatively ancient period of gravel deposition. Aside from the gravels there is no geologic clue as to the age of the artifacts, either relative or absolute. It seems apparent, however, from an examination of the site that the artifacts were intruded into the gravels long after the gravels were laid down. Thus, because the artifacts cannot be tied to a local geologic event the first condition is not satisfied and the geologist can go no farther.

The shelters are altogether different. Their stratigraphy provides an ideal point of departure for the geologic method. The cultural material is entombed within a natural deposit representing a definite geologic event, the blowing of fine dust out of the sandy bed of the Plaza Larga. Condition number one is satisfied. The second condition is met because this dust can be traced southward where it lies along the disconformity between the Nos. 2 and 3 Fills. Thus the single event is related to a local sequence of successive intervals of erosion and of alluviation of the stream channel. This local sequence is a fragment of the larger sequence, the "Alluvial Chronology," which although not well displayed at the site can be established elsewhere in the Plaza Larga and in nearby streams. This chronology is now established not only in eastern New Mexico but also at many other localities in the Southwest. Requirement number three is met. The final condition is answered by the archeology. The cultural material provides a reasonably precise date for the local geologic event. The date is in accord with that arrived at for similar events recorded through three Southwestern States.

On the basis of the physical evidence, it is indisputable that at the time of the occupation of the shelters the Plaza Larga was suffering from a period of channel trenching, wind activity, and eolian accumulation of sand and dust. The conditions must have paralleled very closely those of the present day. The Plaza Larga was then, as now, an intermittent stream. During most of the year the stream bed was dry and winds funneled down its channel, picking up sand and dust and showering it on the occupants of the shelters.

It is also evident that the Plaza Larga had a completely different aspect between this erosion and the modern channel trenching. The stream bed filled with alluvium (the No. 3 Fill), the old arroyo scars healed, and water holes lined its now-eroded course, a condition recorded by the pioneers of the area. We further know that, immediately preceding the erosion period during which the shelters were occupied, the Plaza Larga was aggrading, and the stream had much the same appearance as did the grassy-bottomed draws of 50 years ago.

This fragmentary record of events keys into the "Alluvial Chronology" of Eastern New Mexico and the Southwest. This correlation is presented in table 1. The importance of the Hodges site lies in the fact that a given event in this chronology can be dated. The wind-borne material representing the erosion interval between the Nos. 2 and 3 Fills contains pottery and artifacts. Dick suggests that the material falls between A. D. 1300 and 1540. Thus the sand which contains this material and the arroyo cutting with which it is correlative must share these dates. The dates cannot be considered exact limits for this interval but probably approximate such limits. The arroyo cutting in the vicinity of the site is known to have occurred throughout the Canadian Valley. The date determined at the Hodges site may be applied to this event throughout the general area.

The "Alluvial Chronology" of eastern New Mexico is similar in most details to the late Pleistocene sequence throughout the Southwest. The complete correlation of these sequences, as developed at various points in Texas, New Mexico, and Arizona, is not here presented.[4] Table 2, however, lists various localities at which are present erosion intervals equivalent to the period of arroyo cutting during which the shelters at the Hodges site were occupied. At several of these localities, as indicated in the table, an estimate of the time period involved by this arroyo cutting and some statement concerning contemporary human activity is possible.

The actual date of this arroyo cutting undoubtedly varied from place to place throughout the Southwest, even as has the initial date for the modern epicycle of erosion. The magnitude of this variation, however, was probably not great enough to account for the discrepancies among the various dates listed in table 2. The reason for these discrepancies appears, rather, to reflect the method of dating.

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[4] For a complete summary of these chronologies, the reader is referred to Bryan, 1941; Bryan and McCann, 1948; and Hack, 1942.

An exact date for the interval at any locality is extremely difficult, if not impossible, to establish. Two conditions must be met before an exact date can be determined. First, the cultural material must be related to both the beginning and to the end of the interval. Second, this material must be so diagnostic that the archeologist can narrowly restrict it in time. The difficulties arising from these two conditions are illustrated by the Hodges site. First, there is at this site no evidence, either archeologic or geologic, that the occupation period in the shelters spans the entire period of the coincident arroyo. It probably does not. Therefore no date arrived at via the cultural objects can represent the entire span of the arroyo. Second, even were the time interval bracketed by cultural horizons—and it isn't—the material from the site cannot be dated as precisely as might be wished. Dick states that the material has a range from A. D. 1300 to 1540 and may even range somewhat before A. D. 1300. But he can adduce no evidence that the occupation is actually defined by this span. On the contrary, although the pottery and artifacts have these maximum dates, they more probably represent a period of time shorter by some unknown amount. Dick suggests that the actual time range represented by the material lies closer to A. D. 1300 than to A. D. 1540.

TABLE 1.—*Correlation of the sequence at the Hodges site with that developed elsewhere in the Canadian Valley and at the San Jon site along the northern edge of the southern High Plains*

Event	Hodges site (Judson)	Eastern New Mexico (Judson)[1]	
		Canadian Valley	San Jon site
Arroyo cutting and wind activity.	Modern arroyo and eolian material.	Modern arroyo, sand dunes and minor deposits of wind-transported material.	Modern arroyo.
Deposition No. 3	No. 3 Fill	No. 3 Fill	Low terraces.
Arroyo cutting and wind activity.	Wind-borne dust containing culture horizon and coincident with arroyo.	Arroyos, sand dunes, and minor deposits of wind-transported material.	Arroyo.
Deposition No. 2b	No. 2b Fill	No. 2b Fill	Sand canyon formation.
Arroyo cutting and wind activity.	No record	Arroyos, minor deposits of wind-transported material and possibly sand dunes.	
Deposition No. 2a	No record	No. 2a Fill	
Arroyo cutting and wind activity.	do	Arroyos, sand dunes, and minor deposits of wind-transported material.	Arroyo.
Deposition No. 1	do	No. 1 Fill	San Jon formation.

[1] Submitted to Smithsonian Institution for publication.

TABLE 2.—*Correlation of the erosion intervals between the No. 2 and No. 3 fills, which is represented at the Hodges site by wind-borne silts, with similar events in Texas, New Mexico, and Arizona*

Locality and investigator	Event	Date (A. D.)	Culture
Hodges site (Judson and Dick).	Arroyo cutting and deposition of wind-borne dust.	1300 to 1540	Late hunting-gathering stage.
West Texas High Plains (Huffington and Albritton, 1941).	Monahans Formation (wind-blown sand).	No date	No record.
Big Bend, Tex. (Albritton and Bryan, 1940) (Kelley, Campbell, and Lehmer, 1941).	Arroyo cutting	Before 900 to 1300	Livermore focus (in part) Chisos focus (in part).
Tule Canyon, Tex. (Judson)[1]	do	No date	No record.
Galisteo Creek, N. Mex. (Bryan, 1941).	do	Before 1400	Pre-glaze I.
Rio Puerco (of the east), N. Mex. (Bryan, 1941).	do	No date	No record.
Grants, N. Mex.,[2] (Bryan and McCann, 1943).	Sand dune formation	875 to 1100	Lobo Complex.
Chaco Canyon, N. Mex. (Bryan, 1941).	Arroyo cutting	After 1200; before 1400	Evacuation of canyon by Puebloan people.
Zuñi River, N. Mex. (Bryan, 1941).	do	No date	No record.
Hopi Country, Ariz. (Hack, 1942).	Arroyo cutting, possibly wind action.	After 1200; before 1500	Late Pueblo III and Early Pueblo IV.
Whitewater Draw, Ariz. (Sayles and Antevs, 1941).	do	1100 to 1300	Undefined pottery culture.
Tsegi Canyon, Ariz. (Hack, 1945).	do	Cut by 1300	Late Pueblo III.

[1] Unpublished.
[2] This event at this locality may not be equivalent to the other events listed.

Several of the dates listed in table 2 were arrived at by a variation of the method discussed above. The cultural material, instead of being related directly to the arroyo interval was related to the last stages of the preceding No. 2 Fill and the first stages of the subsequent No. 3 Fill. The dates thus determined are considered as approximate terminal dates for the arroyo interval. Nevertheless, the same difficulties still obtain; i. e., the cultural material probably does not coincide with the exact beginning or end of the arroyo interval, nor is the archeological control of the date of this material exact.

With the pitfalls of dating understood and the shortcomings of the method appreciated, the discrepancies in dates from locality to locality can be discounted to some extent. The dates, although not exact, are not without a preciseness even though this preciseness varies in degree depending upon the success with which the conditions for absolute dating are met. These dates suggest a synchroneity through the Southwest for the event, the arroyo cutting, which cannot easily be denied. All dated localities, with the exception of the Grants site which may not be related to this general event, have one date in common, A. D. 1300.

This date may well represent the average date for this particular arroyo development throughout the Southwest. Bryan (1941) has pointed out that, in those localities where the evidence is good, the arroyo began to cut certainly after A. D. 1100, probably after A. D. 1200, and the No. 3 Fill which clogged this arroyo began to accumulate prior to A. D. 1400. In addition, he suggests at least a partial relation between arroyo cutting and the shifts in Puebloan populations which date from slightly prior to A. D. 1250 through 1400. Furthermore, the coincidence between this arroyo cutting with the drought of A. D. 1276 and 1299 as recorded in the tree rings of the Southwest (Douglass, 1935, and Schulman, 1938) has been pointed out by several investigators (Bryan, 1941; Sayles and Antevs, 1941; and Hack, 1942). Thus a growing body of geologic, archeologic and botanical evidence gives ever-increasing support to the inference that a period of arroyo cutting existed throughout the Southwest between A. D. 1200 and 1400 and centered around A. D. 1300.

The Hodges site enjoys an importance out of all proportion to its antiquity or archeologic plunder. Its stratigraphy and archeology combine to establish it as another link in the "Alluvial Chronology," the chronology which promises to add much to our understanding of the complex history of the Late Pleistocene in the Southwest.

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River Basin Surveys Papers, No. 6

The Rembert Mounds, Elbert County, Georgia

By JOSEPH R. CALDWELL

CONTENTS

PAGE

Introduction 307
The large mound 309
The small mound 314
The village site 314
Pottery 315
  Lamar Complicated Stamped 316
  Lamar Plain 316
  Lamar Bold Incised 316
  Other types of pottery presumably made during the Lamar period at the Rembert site 316
  Earlier pottery types 317
Artifacts other than potsherds 317
Trait list 318
Conclusions 319
Literature cited 320

ILLUSTRATIONS

PLATES

55. *a*, Aerial view of the Rembert mounds' location and the accompanying village site. The outlined area indicates the mounds, and the location of the test pits is shown by the black dots in the field below. *b*, Pottery pipes, stone disks, projectile point, and shell beads 320
56. Potsherd types 320

FIGURES

36. C. C. Jones' map of the Rembert mounds 308
37. Map showing test pits and wash-outs in the vicinity of the large mound remnant 311
38. Profile of the large mound, adapted from Thomas 312
39. Section through large mound, adapted from Thomas 312
40. Profiles of test pits in the large mound and vicinity 313

THE REMBERT MOUNDS, ELBERT COUNTY, GEORGIA

By Joseph R. Caldwell

INTRODUCTION

During an archeological survey of the Clark Hill Reservoir in Georgia and South Carolina, by Carl F. Miller and the writer from January 12 to June 1, 1948, a number of test excavations were made at the site of the former Rembert mounds. This important group, almost totally destroyed since it was first described by William Bartram in 1773 (Van Doren, 1928, pp. 265–66), has never adequately been treated in a scientific report, and indeed is scarcely mentioned in any recent publication dealing with southeastern archeology. The waters of the new Clark Hill Reservoir will cover the place sometime in 1952, and it is possible that no more digging ever will be done.

The locality of the former mounds is in Elbert County, Ga., on the western side of the Savannah River 3 miles above its confluence with the Broad River and 50 miles above Augusta. There, the river turns eastward on its southeasterly course, curving around broad bottom lands. The aboriginal remains are situated close to the river at the northwestern end of the bend (pl. 55, *a*). The owner of the land is Webb Tatum of Elberton, Ga. His son, Webb Tatum, Jr., who was managing the property at the time of our visit, courteously permitted us to make our investigations.

When Bartram described the works in 1773, they comprised an imposing group of one large and several smaller mounds standing adjacent to some extensive structures which he called tetragon terraces. Bartram was impressed by the size of the main mound, the largest he had ever seen (Bartram, N. D.). Seventy-five years later, the site was visited by George White who noticed that the smaller mounds had been nearly destroyed (White, 1849, pp. 229–230). In 1878, Charles C. Jones, Jr., reported that only traces of the smaller mounds yet remained (fig. 36) and that the tetragon terraces were no more that gentle elevations (Jones, 1878, pp. 284–285). John P. Rogan made an archeological investigation at the site in 1886, under the

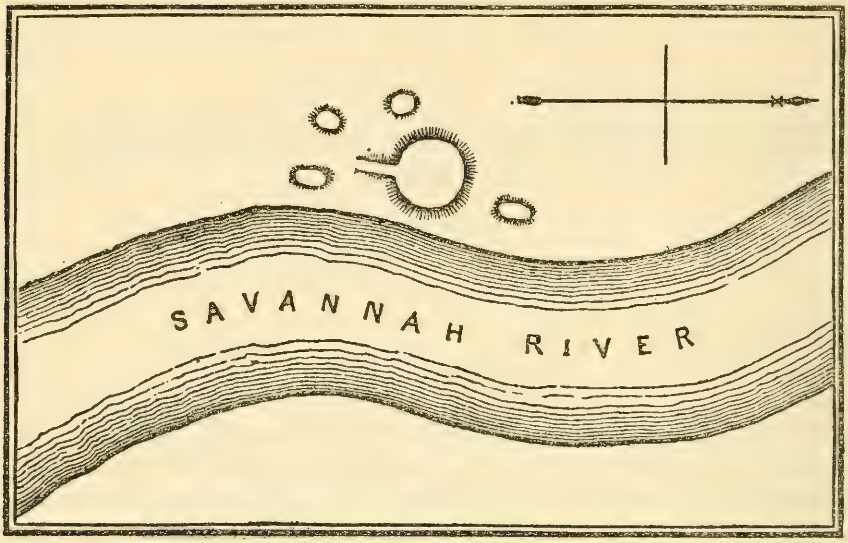

FIGURE 36.—C. C. Jones' map of the Rembert mounds.

general direction of Cyrus Thomas. Thomas reported that only the largest mound and one of the smaller were still standing at that time (Thomas, 1894, pp. 315–317).[1]

When the writer arrived in 1948, it was learned that the large mound had been almost completely demolished during a particularly destructive flood in 1908. The remaining basal portions of the main mound were pointed out by Dude Dubose, an aged man who had played about there when a child, and his identification of the ruin was confirmed by another elderly man introduced to us only as the "Preacher." An unsuccessful search was also made for the small mound which had still been visible in 1886.

During 3 weeks' work, the survey party excavated five test pits in and about the large mound and dug six pits in the adjacent village area. Our purpose was to see if any important structural features might be present and whether there would be a great loss of material if the site were allowed to go under water without further excavation. These pits provided cross sections of strata and brought to light a considerable number of faunal remains, fragments of aboriginal pottery, and a few other artifacts.

The decorated potsherds most frequently occurring in the test pits could readily be assigned to the widespread type named Lamar Complicated Stamped (Southeastern Archeological Conference, 1939) which has been found throughout Georgia and in parts of South Carolina and eastern Tennessee. This is the marker type for the Lamar group of cultures, which in Georgia is correlated with Muskogean-speaking peoples, some of which later were known as Creeks. The pottery style is currently dated between A. D. 1450 and 1650. The Rembert mounds may not have been deserted for more than 200 years before Bartram's visit.

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[1] Most of the material recovered during Thomas' excavation program was subsequently placed in the United States National Museum. Strangely, there is nothing there from the Rembert site.

THE LARGE MOUND

All that remained of the large mound in 1948 was an irregular remnant hidden in a fringe of scrub timber bordering the river (pl. 55, *a*). The remains reached to within 130 feet of the water's edge forming an elevation about 4 feet above the surrounding land and about 118 by 35 feet in extent. The rampaging of the river was everywhere apparent: washouts noted by Jones and Thomas were still pronounced, and another, reaching between them around the remains of the mound, was plainly that which had caused its destruction.

In 1773 the appearance of the large mound had been described by Bartram as follows:

> The great mount is in the form of a cone, about 40 or 50 feet high, and the circumference of its base 200 or 300 yards, entirely composed of the rich loamy earth of the low grounds: the top or apex is flat: a spiral track or path leading from the ground up to the top is still visible, where now grows a large, beautiful spreading red cedar (Juniperus Americana): there appear four niches excavated out of the sides of the hill, at different heights from the base, fronting the four cardinal points; these niches or sentry boxes are entered into from the winding path, and seem to have been meant for resting places or lookouts.

Jones in 1878 (fig. 36) wrote about the mound in this fashion:

> Overleaping the river bank, the turbid waters had carved deep pathways in the surface of the valley on both sides of the "great mount." There it remained, however, totally unaffected by these unusual currents. It had evidently suffered no perceptible diminution in its recorded dimensions. The Savannah River still pursued its long established channel, but "the four niches or sentry boxes," if they formerly existed, were entirely gone, and of "the spiral path or track leading from the ground up to the top" we could discover no trace. On the south a roadway, about 15 feet wide and commencing at a point some distance from the base of the mound, leads with a regular grade to the top. This manifestly furnished the customary means of ascent, as the sides are too precipitous for convenient climbing. This feature seems to have escaped Mr. Bartram's observation. . . .
>
> The material employed in erecting this large tumulus differs from the soil of the surrounding bottom. It is a dark-colored tenacious clay while the surface of the valley is covered with a micaceous loam readily dissolving into an almost impalpable powder. Nearby are no traces of pits or excavations. Nor are there any indications that any earth was scraped up around the base. These facts afforded confirmation of the statement made by the present owner of the plantation upon which these tumuli are located, that the big mound had been built with clay brought from the Carolina side of the Savannah River.

> There clay abounds; and we were informed that in the side of the hill immediately opposite, the excavations may still be seen whence the tough material was obtained for heaping up this mound.

Thomas, 1894 (figs. 38, 39) described Rogan's excavations in the large mound:

> This, which is much the larger of the two, stands 130 feet from the river bank, and is, exclusive of the ramp or projection, an exact circle 151 feet in diameter, nearly flat on top, and 30 feet high at the highest point (north side), but only 27 feet near the south side. The diameter of the top is about 70 feet. The plan of the ramp or rather extension, as it seems to be, is shown. . . . The vertical outline of the mound, with a section of the shaft, is presented . . . [see fig. 39]. The right or southern end of this shows the slope of the extension. This has an average width on top of 20 feet.
>
> The mound is covered with trees such as sugarberry, walnut, hickory and oak. One sugarberry is 6 feet in circumference (at stump height); a walnut, 5 feet; a hickory, 3½ feet; and an oak 10 feet. The shaft was carried down to the bottom. The first foot was of soil [fig. 39, *A*], then 7 feet of dark sandy loam [*B*], next 1½ feet of thoroughly burned yellowish clay and sand [*C*], with a large percentage of ashes. This layer had the appearance of having been put down and packed while wet and then burned; it was so hard that it was difficult to break it. Next 3 feet of black earth, also packed [*D*]; then 8½ feet of pure sand [*E*]; and last, resting on the original surface, 6 feet of hard bluish muck [*F*]. All these layers, except the bottom one, had charcoal, mica, fragments of pottery, and animal bones scattered through them, but the last were so far decomposed that none of them could be saved.
>
> As fragments of pottery and animal bones were found in spots, together with ashes and other indications of fire, it is probable that these were fire beds where cooking had been done. All that portion of the shaft below the layer of burned clay was so very dry that when turned up it would crumble to dust. It is possible that the bottom layer of blue "muck" is partly the original soil, as it is so much like the surrounding soil, and that a part of the surrounding surface has been washed away since the mound was built.

Our authorities do agree that the mound was circular with a flat top, and both Jones and Thomas describe and illustrate a ramp projecting from the southern side. Bartram's failure to mention this ramp, which could not have been less conspicuous in his day, casts doubt upon his observation of a spiral path with four niches or sentry boxes. Jones found no such features, and questioned whether they ever had been present. A spiral path would seemingly have been interrupted by the projecting ramp. No such niches as Bartram noticed have ever been reported in the Southeast, but mounds with two ramps, one projecting and the other ascending along one side, have been found in Georgia, for example, on the large Tumlin mound near Cartersville in the Etowah Valley (Thomas, 1894, pl. 16) and on one of the superimposed mounds at Irene on the Georgia coast (Caldwell and McCann, 1941, fig. 9).

Jones' suggestion that the mound had been built of clay brought across the Savannah River seems not only incredible, but senseless on the part of the builders. Bartram's opinion was that the mound was "entirely composed of the rich loamy earth of the low grounds," and Thomas, discussing the washouts flanking the mound, says that "there are reasons for believing that at least a portion of the earth used in the construction of the mounds was obtained here, leaving depressions, and that, during high water, when the land was overflowed, as is frequently the case, channels were washed out from them to the river." None of the mound layers encountered by Rogan and Thomas corresponded to the type of clay described by Jones except possibly the extreme bottom layer which Jones could not have seen. The real coup de grace to Jones' theory, however, is administered by the multitude of potsherds, animal bones, etc., which Thomas found scattered through the mound and which must have been scraped up with the soil from the adjacent village site.

Our own test pits in the mound, Nos. 2 and 6 (fig. 40) showed that a considerable portion of the mound base had not been disturbed by the flood of 1908. Our strata can be correlated with Thomas' account of the mound structure when we consider that his upper levels have been washed away. All the layers we noticed in pits 2 and 6 occurred in Thomas' second lowest level, that which he called 8½ feet of pure sand. Thomas wrote that this layer was the lowest stratum containing potsherds, thus it must have extended down to our pre-

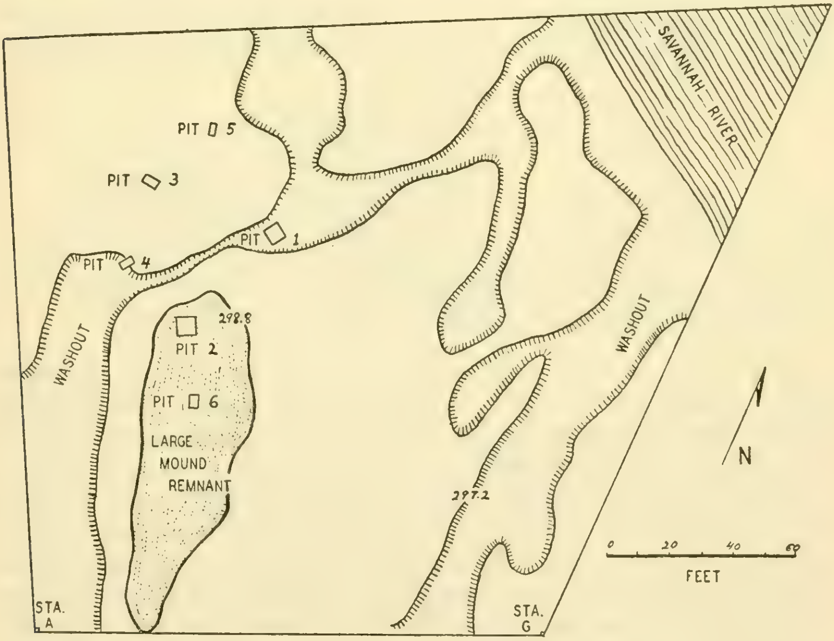

Figure 37.—Map showing test pits and wash-outs in the vicinity of the large mound remnant. Adapted from a topographic map by Kelly Mims, U. S. Engineers.

mound occupation layer. The premound occupation zone is shown in figure 40 on the profile of pit 6. It was also found in pit 2, but did not appear on the west wall which is illustrated. This layer was composed of a 2-inch thick deposit of dark gray sand containing numerous potsherds and animal bones. Augur tests showed that the undisturbed sand below became gradually infused with clay as it extended downward. All the mound layers we found in the two test pits sloped downward toward a central point which presumably was the center of the mound. The significance of this cannot be determined without additional excavation.

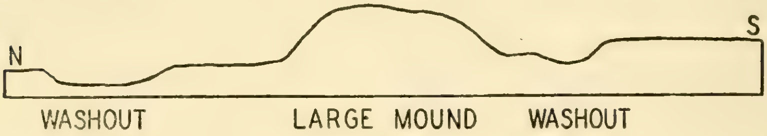

Figure 38.—Profile of large mound, adapted from Thomas.

Thomas' lowest level was:

> . . . resting on the original surface, 6 feet of hard bluish muck. . . . It is possible that the bottom layer of blue "muck" is partly the original soil, as it is so much like the surrounding soil. . . .

Our own findings corroborated Thomas' opinion that his lowest layer was natural and not part of the mound structure. It appeared to be undisturbed in our pits, contained no cultural material, and did indeed resemble the soil in the bottoms surrounding the mound. Thomas' diagram (fig. 39) shows this lowest layer rising 6 feet above the surrounding terrain. This is evidently a mistake. Our measurements show the top of this layer to be at the general ground level, not greatly changed since 1886.

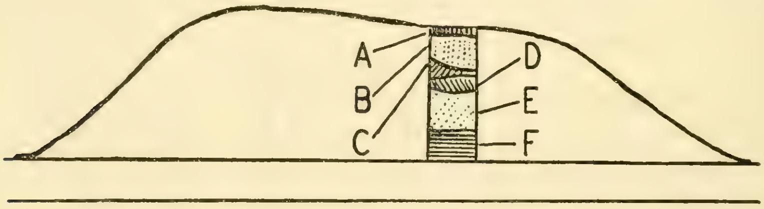

Figure 39.—Section through large mound, adapted from Thomas.

Three other test pits, Nos. 3, 4, and 5 were dug in an irregular elevation 40 feet northwest of the remnant of the large mound to see if this rise might be the small mound excavated by Thomas and Rogan. Judging from the slope and nature of the deposits uncovered, what we actually found was the feather edge of the large mound on the northwest side. If we consider the approximate center of the mound to have been the point toward which the deposits in pits 2 and 6 sloped downward, then the position of pits 3 and 5, respectively 60 and 80 feet from the supposed center, is approximately the radius of the mound, the diameter of which, according to Thomas, was 151 feet.

The three upper layers in pit 3 (fig. 40) were water deposited and may have developed since the abandonment of the site by the Indians. Layer 4 was composed of dark organically stained sand containing a considerable amount of clay in massive deposits. All the cultural material found in the pit came from this layer, which was full of potsherds, animal bones, and irregular rocks and pebbles. The bones looked extremely fresh when first brought to light and not at all decomposed. The bulk of the deposit sloped downward toward the west. Unfortunately, we did not have time to enlarge this excavation.

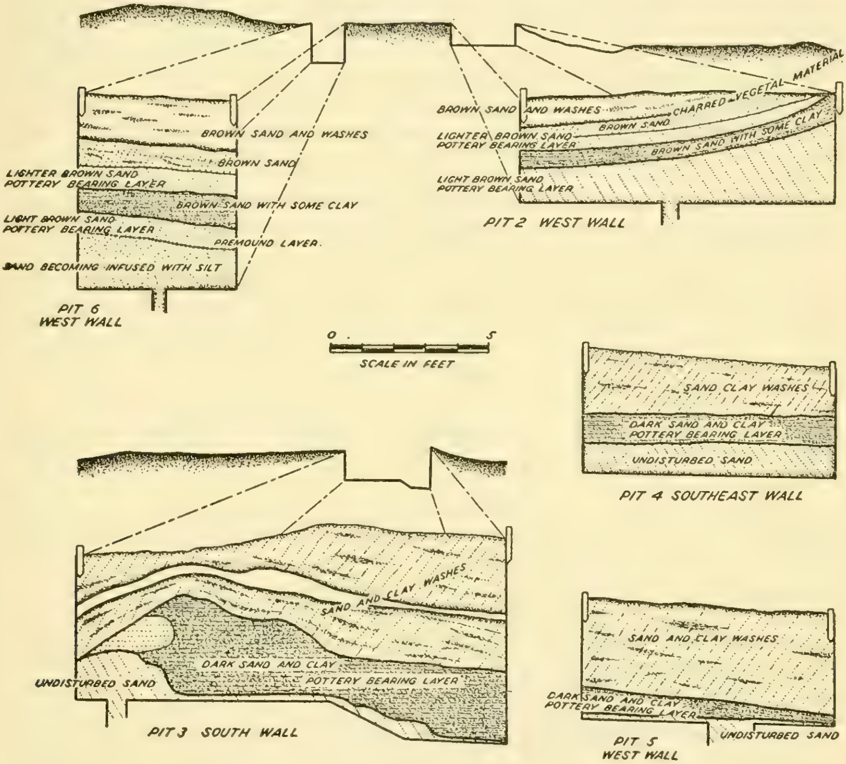
BROWN SAND AND WASHES
BROWN SAND
LIGHTER BROWN SAND POTTERY BEARING LAYER
BROWN SAND WITH SOME CLAY
LIGHT BROWN SAND POTTERY BEARING LAYER
PREMOUND LAYER
SAND BECOMING INFUSED WITH SILT
PIT 6 WEST WALL
BROWN SAND AND WASHES
CHARRED VEGETAL MATERIAL
BROWN SAND
LIGHTER BROWN SAND POTTERY BEARING LAYER
BROWN SAND WITH SOME CLAY
LIGHT BROWN SAND POTTERY BEARING LAYER
PIT 2 WEST WALL
0
5
SCALE IN FEET
SAND CLAY WASHES
DARK SAND AND CLAY POTTERY BEARING LAYER
UNDISTURBED SAND
PIT 4 SOUTHEAST WALL
SAND AND CLAY WASHES
DARK SAND AND CLAY
POTTERY BEARING LAYER
UNDISTURBED SAND
PIT 3 SOUTH WALL
SAND AND CLAY WASHES
DARK SAND AND CLAY POTTERY BEARING LAYER
UNDISTURBED SAND
PIT 5 WEST WALL

Figure 40.—Profiles of test pits in the large mound and vicinity.

Pits 4 and 5 were dug 23 feet to the south and 24 feet to the west of pit 3 respectively. Pit 5 also showed the outward slope noticed in pit 3, probably the feather edge of the mound. Pit 4 contained the same strata as pits 3 and 5, but did not show any slope.

THE SMALL MOUND

In Thomas' time only one of the smaller mounds was still noticeable. He described it as standing:

> . . . about 40 feet west of the base of No. 1. It is oblong in form, 58 feet long north and south, 41 feet wide, and 6 feet high. A large shaft had been sunk in the middle by some previous explorer, hence investigations were confined to the eastern and western sides, which presented one or two peculiarities. With the exception of the top layer of soil, one foot thick, the remainder of the east side consisted of river sand, with particles of charcoal and vegetable matter mixed through it, while on the west it was composed of small masses of red clay and dark earth. In this, at a depth of 2½ feet were the bones of a single adult skeleton. These were packed together in a space 2 feet square and 18 inches deep; the skull was placed face down and all the other bones piled about it. Immediately over the bones was a layer of red clay 2 inches thick, burned hard. Resting on this layer were the remains of a pretty thoroughly burned fire. A few fragments of pottery and a small clay pipe were found.

We presume that the other small mounds seen by Bartram and Jones were burial mounds. White (1849, p. 230) wrote that:

> Captain Rembert has excavated the smaller mounds and found human skeletons, jars, pipes, beads, breast-plates, stone hammers, hatchets, arrowheads, etc. . . .

THE VILLAGE SITE

There is no doubt that the Rembert mounds stood upon an extensive village site. Bartram stated that there were:

> . . . some very large tetragon terraces on each side [of the mound group], near one hundred yards in length, and their surface four, six, eight, and ten feet above the ground on which they stand.[2]

We have already noted that when Jones visited the site:

> The tetragon terraces had lost their distinctive outlines, and were little more than gentle elevations; their surface littered with sherds of pottery, flint chips, and occasionally fragments of human bones.

In 1948 no surface materials were visible in the area adjacent to the mound except for a few sherds in the old washout to the west. Six test pits were dug in the general village area (pits 7–12) and cultural material appeared in four of them. The locations of these pits are shown in plate 55, *a*. Each one was only about 2 feet square and it seemed unnecessary to mark them for future reference. The cultural deposits encountered in the pits varied from 0.7 to 1.4 feet in thickness and in pit 7 obtained a thickness of 3.3 feet. Most of the material found consisted of potsherds, but pit 12 yielded animal bones and ash as well. Exploratory trenches in this area would be advisable if additional work should be done at the site.

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[2] Bartram's term "tetragon terrace" which he also calls a "four square" terrace, is today obscure. Elsewhere in his writings he has said "the tetragon terraces seem to be the foundation of a fortress" (Van Doren, 1928, p. 407), and "Cherokee mounts are always accompanied by the vast tetragon terraces placed at one side or the other" (Bartram MS., p. 83). He states that tetragon terraces are characteristic of the region of northern Georgia and adjacent States which were formerly occupied by the Cherokees, but are not found in the lower Creek country south and west of the Altamaha River. (See Van Doren, 1928, pp. 406–407.)

POTTERY

The numerous potsherds found by us at the Rembert site were examined while they were coming out of the test pits but there was no evidence of stratigraphic change in the pottery types. The large mound and village area were used for the most part during one major period, although random sherds datable to earlier times indicate sporadic occupations by previous peoples. The bulk of the decorated sherds from all the test pits belong to the type of pottery called Lamar Complicated Stamped. This is a common style at late sites in most of Georgia and the adjoining parts of South Carolina and eastern Tennessee. Fairbanks has suggested the dates 1540–1650 for the type as it occurs in central Georgia (Fairbanks, 1946, p. 103), the region where it was first described (Southeastern Archeological Conference, 1939). A terminal date of 1600 was suggested for the variant which was found at the Irene site on the Georgia coast (Caldwell and McCann, 1941, pp. 46–47). A recent statement is that:

> The Lamar site at Macon and the Irene site on the coast are among the latest prehistoric sites in their respective areas. No historic materials have been found at either, but Waring has reported Spanish wheel-made pottery from some coastal Lamar sites, and historic chinaware and nails were found in the upper levels at Hollywood [near Augusta on the Savannah River]. A number of historic Cherokee sites in eastern Tennessee and western North Carolina have a Lamar-like pottery which is considerably later than in Georgia. It is likely that many and perhaps all Lamar-like sites are post DeSoto [Caldwell, n. d.].

A. R. Kelly and Gordon R. Willey are now inclined to a somewhat earlier beginning date for Lamar Complicated Stamped (personal communication from Gordon R. Willey) but no earlier than 1450. We are on fairly sure ground if we place the occupation at the Rembert site between this date and 1650.

The most abundant single type of pottery at the Rembert site was Lamar Plain. A variant of this has been described on the Georgia coast (Caldwell and McCann, 1941, pp. 48–49) but not in central Georgia where it also occurs. At the Rembert site as elsewhere, association with the stamped type and correspondence in many ceramic features other than surface finish indicate that Lamar Plain was made at the same time as Lamar Complicated Stamped. This is also true of the type Lamar Bold Incised (News Letter, Southeastern Archeological Conference, 1939). The corresponding type on the

Georgia coast is Irene Incised (Caldwell and McCann, 1941, pp. 47–48).

LAMAR COMPLICATED STAMPED (pl. 56, *A–F*)

This type of pottery at the Rembert site was made of gritty local clay by the coiling method usual in the southeast, and further tempered with relatively large particles of quartz. The exterior surfaces of the vessels were fired to colors ranging from dark gray through shades of brown to red and buff. The firing was not well controlled. A single color is often seen to prevail over a large vessel fragment, but it is not unusual to find a sherd showing two or more shades of color. The interior surfaces were frequently darker than the exterior, generally well smoothed, often burnished.

The entire exterior surfaces of the vessels were stamped with impressions of carved paddles, possibly of pottery or wood. A rather elaborate fylfot cross was the principal design motif (pl. 56, *A–D*) here as in central Georgia and on the coast, but other designs are found as well (pl. 56, *E*, *F*) in all three areas. Most vessel rims at the Rembert site have an applique strip below the lip, which was decorated by incising, notching, or pinching. No complete vessels were found, but the sherds indicate that the customary Lamar form of jar with rounded bottom, rounded sides, and outcurving rim was present. The sides seem to be somewhat straighter and the rim less flaring than in central Georgia or on the coast.

LAMAR PLAIN (PLATE 56, *G–L*)

The unusually high proportion of plain pottery at the Rembert site is itself a noteworthy fact. The sherds conform well to the coastal type in paste and surface finish, but there are proportionately more jars and fewer bowls. The former have the straighter sides and less pronounced rim flare which we noted to be characteristic of the stamped pottery. Similar applique rim treatment is frequently found.

LAMAR BOLD INCISED (PLATE 56, *M*)

Only three sherds of this type were found, and since a much higher proportion is usual at Lamar sites elsewhere, we consider the scarcity of Lamar Bold Incised to be a distinctive feature of the local pottery complex.

OTHER TYPES OF POTTERY PRESUMABLY MADE DURING THE LAMAR PERIOD AT THE REMBERT SITE

A few other sherds are believed to have been made at the same time as the Lamar types because they conform to these in most respects except surface finish. They were too few, however, to be assigned type names. Plate 56, *N* is one of a group which shows a curiously rough and uneven surface. This might be intentional roughening or possibly the circumstance of the vessel having been fired without first having been smoothed. Other sherds show a lightly brushed or combed surface (pl. 56, *Q*), still fewer are cord roughened (pl. 56, *S*), and two sherds look as though they might have been decorated with a corncob, although it is unlikely that this was the method used.

EARLIER POTTERY TYPES

Some sherds resembling types which in other areas have been found stratigraphically below Lamar pottery show that the Rembert site was occasionally occupied during earlier times. A few may be Savannah Check Stamped (not shown) (Caldwell and McCann, 1941, pp. 44–45). Others had the distinctive bar and triangle and bar and circle designs which are called Etowah Stamped (pl. 56, *O*, *P*). This type has been found abundantly at the Tumlin mounds near Cartersville, Ga., and at other sites on the Etowah River (Wauchope, 1948, pl. 18, *B*, top row). Still earlier pottery in the Etowah area is like the check stamped sherd shown in plate 56, *V*, the simple stamped sherd, 56, *U*, and the sherd decorated by a cord-wrapped stick, 56, *T*. Not shown is a specimen of the type Woodstock Diamond Stamped (Wauchope, 1948, pl. 18, *A*, top row), and an unidentified net-marked sherd.

ARTIFACTS OTHER THAN POTSHERDS

Such objects were not especially frequent, but nearly all specimens were characteristic of other Lamar sites in Georgia.

Sherd disks (*pl. 55*, *b*, *E*).—Seven disks made of sherds were found. Four of them were made from Lamar Complicated Stamped sherds, two were plain, and the decoration of the other was indistinct.

Pottery pipes (*pl. 55*, *b*, *D*, *H*).—There was one complete pottery elbow pipe and one pipe bowl fragment. No tempering material was visible in either. Both had burnished exterior surfaces.

Fired clay wall plaster (*pl. 55*, *b*, *A*).—Three small fragments showing wattle impressions indicated the former presence of wattle and daub buildings.

Bone tube (*not illustrated*).—A fragment of a cut bone tube (probably turkey tibio-tarsus) 4½ inches long and ½ inch in diameter was found. A roughly triangular perforation in one side three-fifths of the distance from the cut end may be accidental, for the specimen is in bad condition.

Stone disk (*pl. 55*, *b*, *F*).—There was one small greenstone disk, somewhat chipped. Thickness about ⅜ inch.

Stone projectile points.—In this region at present, only a few types of stone points can be assigned to chronological periods. One of the two points found at Rembert's (*I*), made of quartz, can be duplicated at other Lamar sites. The remaining specimen, a fairly large coarsely flaked stemmed point of weathered chert, resembles examples from Stalling's Island (see Claflin, 1931, for various examples of early points) and is probably an old type.

Stone chips (*not illustrated*).—Several chips and flakes of quartz and chert were recovered in the excavations, but such materials are much less frequent at Rembert's than at most sites in the vicinity.

Shell (*pl. 55, b, B, C*).—One massive bead made of the central columella of conch, and two small disk beads probably also conch, were found. There was also one cut fragment of conch shell. Such shells must have been brought from the ocean, probably from the Georgia-South Carolina coast.

Other materials.—There were two small unworked fragments of sheet mica, obtainable locally, and a piece of bitumen, probably from the coast.

TRAIT LIST

General:

A fair-sized town with a group of burial mounds around a very large substructure mound with associated tetragon terraces.

Mound building and burial:

Large mound circular with flat top and a projecting ramp from the summit, but probably not with a spiral ramp and probably not with niches or sentry boxes at the cardinal points.

The mound constructed of layers of sand and clay probably obtained from the ground adjacent and the lower building deposits sloped inward toward the center of the mound.

The smaller mounds contained burials with grave offerings which according to White were: Jars, pipes, beads, breastplates, stone hammers, hatchets, arrowheads, etc.

An oblong mound (dug by Rogan) had a burial of the bundle type face down and other bones on skull and over it a layer of red clay burned hard with fragments of pottery and a clay pipe perhaps associated.

Pottery:	*Occurrence*
Lamar Complicated Stamped	Frequent.
Lamar Plain	Frequent.
Lamar Bold Incised	Few.
Minority Lamar (?) types	Few.
Etowah Stamped	Moderate.
Savannah Checkstamped	Few.
(Early) Checkstamped	Few.
(Early) Simple Stamped	Few.
(Early) Cordwrapped Stick Decorated	Few.
Woodstock Diamond Stamped	Few.

Other artifacts:

Sherd disks	7
Pottery elbow pipes	2
(Fired) clay wall plaster	3
Bone tube	1
Stone disk (small)	1
Stone projectile point, triangular, slightly concave base, quartz	1
Stone projectile point (probably pre-Lamar), large, stemmed, coarse chipping, weathered chert	1
Stone chips, quartz, and weathered chert	X
Shell bead, massive conch	1
Shell bead, small disk, conch (?)	2
Shell cut fragment, conch	1
Mica, small unworked fragments	2
Bitumen, small piece	1

Mammalian remains:[8]

- Deer (*Odocoileus virginianus*):
  - 2 distal ends of humeri.
  - 1 Distal end of ulna.
  - 2 fragments of ulnae.
  - 1 distal epiphysis of femur.
  - 7 fragments of radii.
  - 6 fragments of ribs.
  - 1 fragment of scapula.
  - 5 vertebrae.
  - 1 fragment of pelvis.
  - 8 fragments of mandibles.
  - 3 fragments of maxillae.
  - 1 fragment of antler.
- Raccoon (*Procyon lotor*):
  - 1 mandible.

CONCLUSIONS

The recent investigations at the Rembert site provided certain new data which place this once important mound group into the current picture of southeastern archeology. The site was once the place of a fair-sized town, apparently with permanent buildings of wattles woven between uprights and plastered with clay. The most striking feature must have been the imposing circular and flat-topped substructure mound, with a projecting ramp leading up to the summit, the largest mound Bartram had ever seen. Around this stood a group of burial tumuli and the extensive platforms which Bartram called tetragon terraces.

The mounds and associated village were built and utilized during the Lamar period in Georgia, at some time between A. D. 1450–1650, probably by a Muskogean-speaking people.

Local variations in the Lamar pottery at the Rembert site are straighter sides and less rim flare on jars than are found at Lamar sites in central Georgia or on the coast. There is also a much higher proportion of undecorated pottery and much less pottery decorated by incising. We could discover no stratigraphic variation in the pottery of the Lamar types occurring at the site, although random sherds indicated that the place had occasionally been occupied by earlier peoples.

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[8] Identified by Henry W. Setzer, Division of Mammals, United States National Museum.

The relatively few artifacts other than pottery conform in the main to the kinds of artifacts found at other Lamar sites. The employment of bitumen and the use of conch shells for beads show connections with the Coast.

It is extremely doubtful if the large mound ever had the spiral ramp with niches at cardinal points which Bartram described. We are also inclined to discredit Jones' theory that the large mound was constructed of clay brought from the other side of the Savannah River.

At this writing much of the basal portion of the large mound is still intact. In view of the neglect of this site in the past, it has been recommended that an excavation program be undertaken before 1952 when the place will be covered by water.

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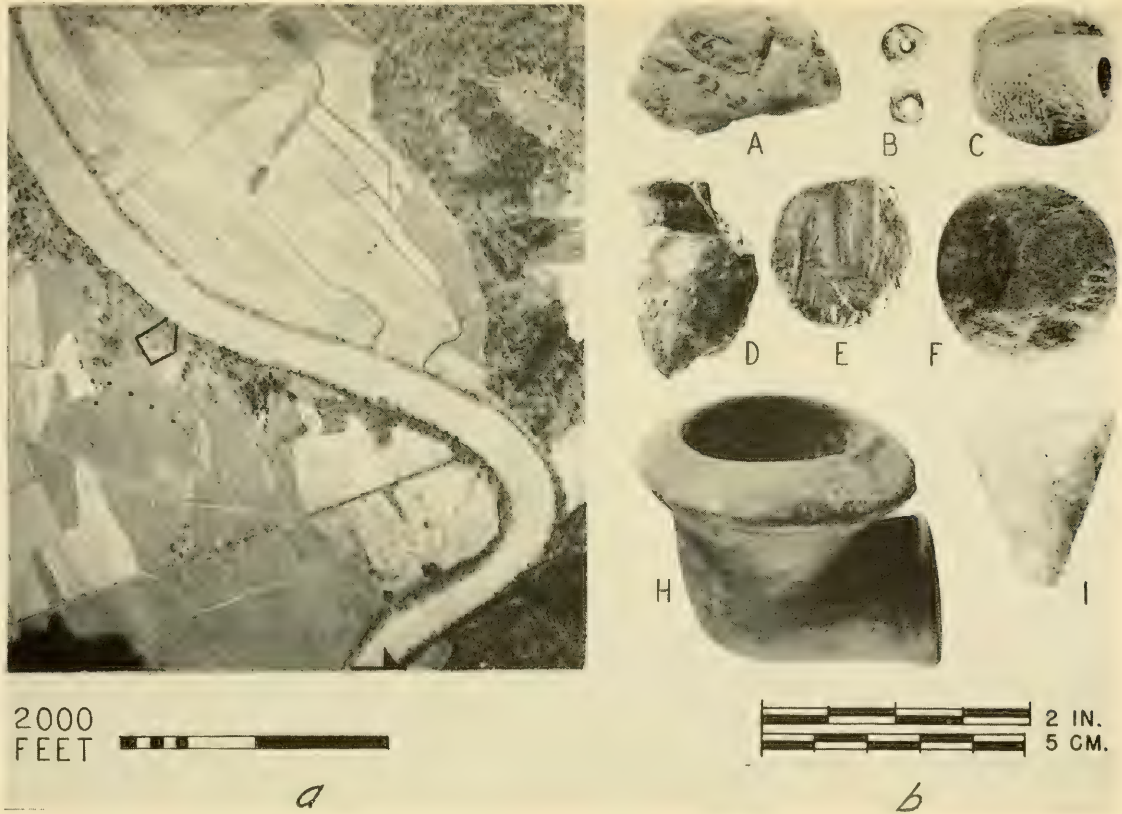
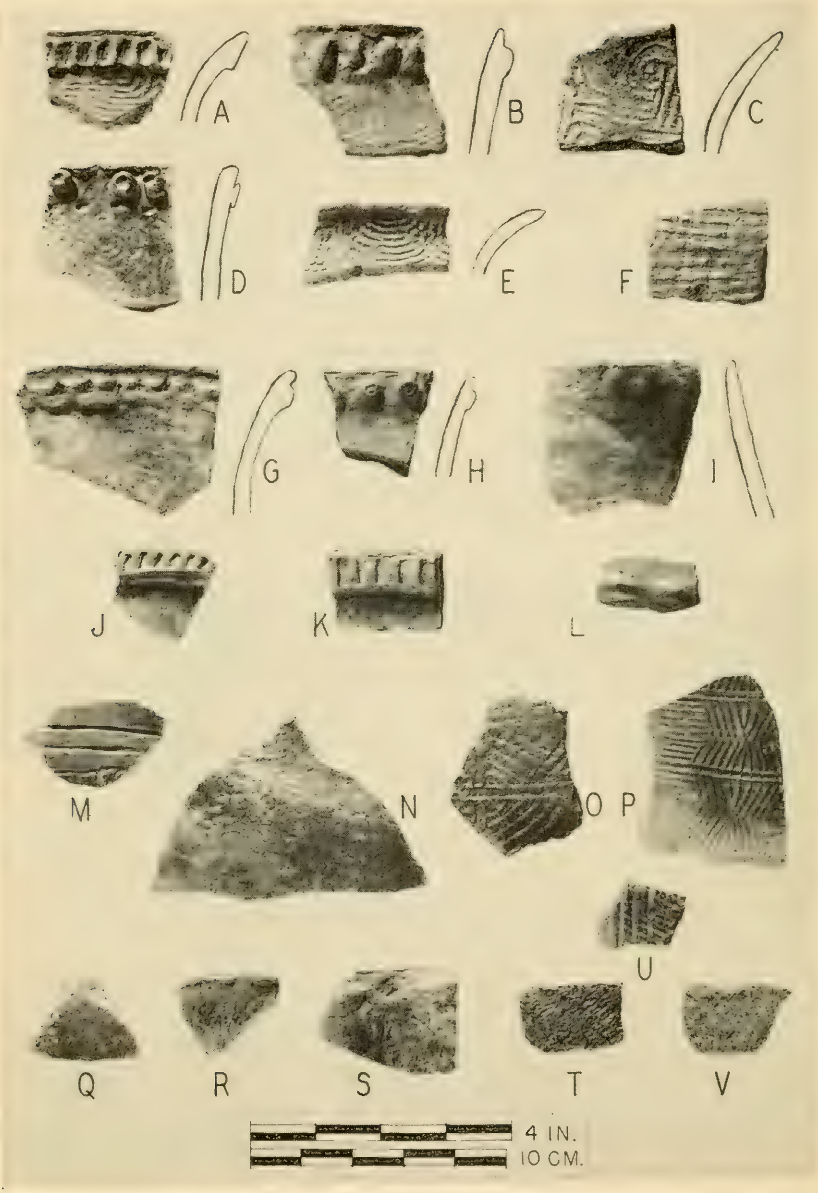


a, Aerial view of the Rembert mounds' location and the accompanying village site. The outlined area indicates the mounds, and the location of the test pits is shown by the black dots in the field below. *b*, Pottery pipes, stone disks, projectile point, and shell beads.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Potsherd types.

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INDEX

Abilene district, Texas, 220
Abraders, sandstone, 37, 41, 42, 201, 227, 229, 242
Addicks Dam Basin, Archeological Survey of (Wheat), 143–252
Addicks Dam Basin, Texas, 151, 152, 154, 161, 163 (map), 196, 238, 243 (graph), 247–248 (table), 265
  discussion, 192–196
  environment, 152–157
  lithic complex, 196–233
  site 42/66A6–6, 166
  site 42/66A6–7, 166–167
  site 42/66A6–8, 167
  summary and conclusions, 238–246
Addicks "Mound" (42/66A6–1), 164 (map), 167, 184, 229, 230, 233, 236, 237, 238, 240, 242, 243
Agaronia testacea, 136
Agate Basin, Wyo., 23, 51
Agate, moss, 276
Agiatrodon mokasen, 157
Akokisa Indians, 158, 159, 160, 161, 162, 234, 245, 246, 258
Alabama Polytechnic Institute, 289
Albuquerque, N. Mex., 276
Alfalfa, 89
Allen site (25FT50), Medicine Creek Reservoir, 49, 50, 51
Alligators, 235, 237
"Alluvial Chronology," 293, 294 (graph), 297, 298, 301
Alma, Nebr., 40, 92
Alma Ossuary (25HN2), 111, 129–130 (table), 131, 135
Amherst, Nebr., 43
Amherst Reservoir, Nebr., 132
Amphibians, 42
An Archeological Survey of the Addicks Dam Basin, Southeast Texas (Wheat), 143–252
Andropogon fuscatus, 156
Andropogon glomeratus, 156
Andropogon haroides, 156
Angostura, S. Dak., 3, 9, 11, 12, 29, 31, 33, 49, 51, 52, 56, 68
Angostura Reservoir site, S. Dak., 20, 21–24, 31, 32, 51, 54, 68, 69, 71, 74–80, 98, 99, 100
  Area A, 77, 78
  Area B, 77, 78
  Area C, 77, 78
  description of, 21, 74
  site 39FA10, 75
  site 39FA23, 76
  site 39FA30, 76, 100
Angostura Reservoir site—Continued
  site 39FA35, 78
  site 39FA38, 78
  site 39FA42, 78
  site 39FA45, 78
  site 39FA48, 78
  site 39FA56, 75
  site 39FA61, 77
  site 39FA65, 50, 77, 98
  site 39FA68, 75, 76
  site 39FA78, 78
  site 39FA79, 78
Animals, furbearing, 79
  game, 79
  hunted, 235–236 (table)
Antelope, 42, 87, 110, 234, 235, 236, 237, 280
Antelope County, Nebr., 43
Anthony, John W., 149
Anthropomorphic figures, 78
Antilocapra sp., 235, 236
Arapaho Indians, 23, 37, 84
Arch Hurley Conservancy District, 290
Arikara Indians, 55, 58, 83
  Caddoan-speaking, 26
Arizona Bureau of Mines, 149
Arizona State Museum, 150
Arkansas River, 54, 111
Arrowheads, 314
Arrow points, 198
  triangular, 22
Arroyo cutting, 298, 300, 301
Artifacts, 40, 42, 45, 48, 55, 75, 77, 93, 111, 118, 130, 274, 291, 297, 317–318, 320
  antler, 111, 118, 119–121, 231 (table), 232, 233
  bone, 42, 83, 95, 111, 112, 114, 116, 118, 119–121, 127, 196, 230 (table), 231–232, 243
  clay, 190
  flint, 80, 95, 171, 227
  ground stone, 240
  iron, 95
  Plainview type, 77
  pottery, 25, 41, 95, 184–196
  shell, 25, 83, 111, 112, 114, 118, 123, 127, 129 (table), 196, 231 (table), 233
  stone, 30, 72, 75, 82, 88, 89, 95, 99, 111, 114, 118, 121–123, 127, 129 (table), 174, 196, 198–201 (table), 220–228, 282
  stratigraphy of, 233
Artiodactyls, fossil, 32, 43

Ash, 1, 9, 26, 38, 84, 109, 110
  blue-foliaged (*Fraxinus americana*), 110
Ash Creek, Kans., 37
Ash Hollow Cave site, 131
Ash Hollow fauna (Middle Pliocene), 43
Ashland, Nebr., 43
Ash lenses, 36
Aspen, 72, 86
Asphalt, use of, 196
Atacapa Indians, 264, 265
Atacapan-speaking Indians, 258
Atlatl weights, stone, 201, 227, 229, 230, 240, 241
Attakapa Indians, 160, 161, 196, 245, 246
Augusta, Ga., 307
Austin, Tex., 276
Avoyel Indians, 162, 246
Awls, 127
  bone, 15, 22, 41, 42, 73, 120, 231, 233, 243
  horse-bone, 73
  splinter, 37
Axhead, iron, 92

Badgers, 235–236 (table), 237
Bad River, S. Dak., 74, 80
Baldhill, N. Dak., 10, 47, 49
Baldhill Creek, N. Dak., 47
Baldhill Reservoir site, investigations, 47–48, 53, 67
Barker Dam, Tex., 151, 163 (map), 166
Barnes, Donald K., 68
Barranca Creek, N. Mex., 271
Barreyro, Alvarez, 159
Barrios, Governor, 160
Bartram, William, Jr., 307, 309, 310, 311, 314, 319, 320
Basketmaker people, 277
Basketry fragments, 83
Batson, A. A., 13
Battle Mountain, S. Dak., 23
Bauxar, J. J., 8, 12, 19, 67, 73
Bazterra, Orobio, 161, 162
Beads, 128, 314
  antler, 233
  bone, 128
  clay, 48
  cylindrical copper, 48
  dentalium shell, 80
  disk, 15, 123
  glass trade, 30, 83
  making of, 123–124
  shell, 126, 131, 136, 318, 320
  shell disk, 52, 112, 113, 114, 115, 116, 117, 118, 123, 127, 130, 136, 318
  tubular bone, 15, 22, 41, 52, 120, 136
  tubular shell, 25
  wooden, 234
Beans, 14, 16, 57, 110
Bear, black (*Ursus americanus*), 157, 162, 234
Bear Creek, Tex., 151, 155, 163, 174
Beaumont formation, Pleistocene age, 154
Beaver, 41, 110
Beaver City, Nebr., 10
Beaver Creek, Boone County, Nebr., 45
Beaver Creek, Wyo., 29, 30
Beaver skull, fossil, 94
Belle Fourche-Cheyenne drainage, 85
Belle Fourche River, Wyo., 30, 31
Bellisle, Simars de, 159, 160, 161, 162, 234, 237
Beranger, Jean, 159, 161
Berries, wild, 79
Bidai Indians, 160, 161, 162
Big Horn Mountains, Mont. and Wyo., 84
Big Horn River, Wyo., 31, 84
Bioto Province, Tex., 156–157
Bird bones, use of, 120
Birds, 42, 157, 235, 237, 280
  fossil, 43
Birdshead Cave, Boysen, Wyo., 10
Bismarck, N. Dak., 26, 27
Bison, 16, 17, 42, 50, 110, 162, 234, 235–236 (table), 237, 277
  extinct, 99
  fossil, 93
  hunters, 79
  kills, 20, 23, 51
  skeletons, 48
  skulls, 94
Bison antiquus, 50
  sp., 235, 236
  taylori, 50
Bitter Creek, Moorhead Reservoir area, 85
Bitternut (*Hickoria cordiformis*), 156
Bitumen, 318, 320
Bivalves, freshwater, 112, 124, 125
Bixby Reservoir area, S. Dak., 68, 70, 71, 74, 80
  investigations, 80
  site 39PE10, 80
Black Hills, S. Dak. and Wyo., 21, 23, 24, 26, 29, 30, 52, 55, 75, 79, 80, 81
Black, W. M. (Marshall Black), 149, 165, 184, 229, 234, 236, 237, 238
Blades, 51, 85, 94, 174
  chipped stone, 30, 31, 42
Blancpain, Joseph, 160
Bliss, Wesley L., 8, 12, 67
Blue River drainage, 127
Bluff Creek, Kans., 35
Bobcat (*Lynx rufus texanus*), 157
Bolton, Herbert E., 161
Bone industries, 57, 119–121
Bones, animal, 36, 41, 42, 51, 69, 76, 77, 78, 80, 82, 86, 87, 90, 93, 94, 99, 165, 236–238, 280, 310, 313, 315

Bones, animal—Continued
    bear, 87
    bison, 19, 21, 41, 73, 87, 280
    deer, 117, 120, 128, 171, 231
    human, 112, 114, 115, 117, 127, 130, 237, 314
Bonny, Colo., 10
Bos sp., 235
Bottles, pottery, 196
Bow and arrows, 17
Bowls, wide-mouthed, 194, 239, 316
Box elder, 38, 72, 80, 84, 109
Boysen Reservoir area, Wyo., 31, 49, 68
Boysen, Wyo., 3, 10, 11, 12, 33
Brass, surface, 41
Brays Bayou, Tex., 155
Brazos River, Tex., 154, 161
Breast-plates, 314
Broad River, Ga., 307
Broom sedge (*Andropogon glomeratus*), 156
Bryan, Kirk, 289
Buffalo, 110
Buffalo Bayou, Tex., 151, 154, 155, 156, 158, 161, 163, 164, 166, 238
Buffalo Creek, Nebr., 10, 43
Buffalo Pasture (39ST6), S. Dak., 28, 29
Buildings, wattle and daub, 317, 319
Bureau of American Ethnology, 27, 65
Bureau of Reclamation, 2, 3, 4, 12, 13, 43, 65, 66, 67, 71, 72, 73, 74, 80, 81, 82, 84, 88, 89, 90, 93, 94
Burial cairns, 35, 36, 37
    mounds, 20, 24, 47, 48, 53, 319
    pits, 22, 47, 239, 242
Burials, 15, 17, 18, 36, 73, 129 (table), 172 (fig.), 173, 180 (figs.), 238, 242
    extended, 129 (table)
    flexed, 36, 77, 129 (table), 171, 178, 181, 182, 239, 242
    primary, 111
    secondary, 25, 52, 116, 117, 127
    semiflexed, 116, 166, 171, 178, 181, 238, 239, 242
Burial sites, 83
    Doering, 258–261
    Harlan County, Nebr., (14PH4), 39
    Kobs, 261–264
Business Council of the Shoshones and Arapahoes, 84
Busycon columella, 136
    contrarium 125, 126
    sp., 128

Cache pits, 40, 54
Cactus, 81
Caddo Indians, 162, 246
Cairo, Nebr., 43
Calcite crystals, 118
Caldwell, Joseph R. (The Rembert Mounds, Elbert County, Georgia), 303–320
Camel, Pleistocene, 15, 94
Campbell, Thomas N., 149, 197
Camp sites, 22
Canadian River, N. Mex., 271, 289, 290, 292, 293
Canadian Valley, N. Mex., 290, 292, 300 (table)
Caney Creek, Tex., 154
Canis, sp., 235, 236
Cannibalism, 162, 237, 238
Cannonball Reservoir area, N. Dak., 68, 70, 71, 72–73
    investigations, 72–73
Cannonball River, N. Dak., 72
Canyon Ferry Reservoir site, Mont., 10, 11, 12, 32, 33, 49, 90
Caplen Mound, Tex., 264, 265
Capoque Indians, 160
Carlsbad, N. Mex., 274, 275, 277, 279, 281, 282, 283
Carnegie Museum, Pittsburgh, Pa., 32
Carnivores, fossil, 32, 43, 94
Cartersville, Ga., 310
Caruncullina texasensis, 235
Cedar, red (*Juniperus americana*), 309
Cedar Bluff Reservoir site, Kans., 11, 12, 33, 49, 88
    investigations, 88–89
    site (14TO3), 88
Celt, chipped, 37, 52, 127, 200, 221, 225, 229
Central Plains sites, 53, 57, 58, 119, 121, 122, 126, 128, 131, 137
Ceramics, 281
    See also Pottery.
Ceramic stratigraphy, 190–192
Chalcedonic flakes, 121
Chalcedony, 274, 275, 277
Champe, John L., 38, 41, 44, 91, 107
Charcoal, 36, 76, 77, 78, 82, 90, 111, 112, 117, 120, 175, 238, 310
Cherokee Indians, 314, 315
Chert chips, 35, 318
Chert cores, 30
Chert, mottled, 274, 275, 277
Cheyenne Indians, 23, 24, 26, 37, 79, 111
Cheyenne River, S. Dak., 20, 21, 27, 28, 32, 51, 74, 76, 78
Cheyenne River Basin, Wyo., and S. Dak., 10, 11, 24, 29, 52, 79, 81
Chimney Butte, S. Dak., 82
Chinle formation, 290, 291
Chokecherry, 19, 109
Choppers, 86, 221 (table), 225, 229, 240, 243, 278, 283
    bone, 41
    chipped stone, 200
Cimarron River, N. Mex., 277, 281, 283
    Valley, 277
Cist, rectanguloid, 36
Clams, 157, 165, 235
Clark, Dean, 8, 68
Clark Hill Reservoir, 307
Clear Creek, Kans., 35, 36
Clear Creek, Wyo., 85
Clear Fork, Tex., 23, 154

Clearwater Creek, Antelope County, Nebr., 46
Clearwater, Nebr., 46
Clearwater Reservoir, *see* Rosedale Reservoir.
Climate, 155–156
Cocos Indians, 158, 160, 161
Colorado River, Tex., 154, 160, 161
Columbia University, 27
Columbus, Nebr., 43
Comanche Indians, 23, 55
Committee for Recovery of Archeological Remains, 2, 66
Conboy, Neal, 23
Conchos River, México, 274
Condylarths, fossil, 32
Cooper, Paul L., 8, 12, 19, 20, 24, 68, 70, 73, 107
Copperhead (*Agkistrodon mokasen*), 157
Corn, 16, 89, 109, 113, 115
  charred, 14
Corn-growing people, 24
Corps of Engineers, 2, 4, 20, 24, 34, 37, 41, 47, 65, 66, 97, 149, 151
Corpus Christi Bay, Tex., 274
Cottonwood, 19, 26, 35, 38, 72, 80, 84, 86, 109, 110
Cottonwood Creek, Wyo., 31, 32
Coyote, 42, 110
Creeks, 309, 314
Crotalus horridus, 157
Culbertson, Nebr., 10
Cummings, Robert B., Jr., 8, 68, 107, 137
Cushing, Nebr., 44, 49
Cushing Reservoir site, investigations, 44–45

Dakota Sioux Indians, 26
Dart points, 198
Davis Creek Reservoir, Nebr., 4, 10, 68, 70, 132, 133
Davis, E. Mott, 91, 93
Deadoses Indians, 160, 161
Deer, 17, 41, 42, 87, 100, 234, 235–236 (table), 237, 319
  antlers, 94, 119, 127
  Virginia (*Odocoileus virginianus texanus*), 157
Deer Creek, Wyo., 31
Dentalium shell, 80
Department of the Army, 65
Department of the Interior, 65
Devil Dive Creek, Wyo., 86
Devils Lake, N. Dak., 53
Dick, Herbert W., 289, 299
  (Two Rock Shelters near Tucumcari, New Mexico), 267–284
Dickinson, N. Dak., 73
Dickinson Reservoir site, N. Dak., 70, 71, 72
  investigations, 73–74
Didelphis sp., 235
Didelphodus sp., skull of, 32
Didymictus sp., skull of, 32
Digging sticks, 117
Digging tools, chipped-stone, 48
Disks, chipped, 37
  copper-covered wooden, 111
  sherd, 317
  stone, 317
Dismal River culture, 55, 57, 92, 93, 100, 111, 132
  people, 22, 46
  site (25H021), 95
  sites, 39, 51, 55, 95, 96
Doering sites, 190, 191, 194, 214, 215 (graph), 218, 219, 229, 233, 236, 237, 238, 240, 241, 243, 244, 245
  site 42/66A6–2, 167, 168 (map), 169 (map), 170 (map), 172 (fig.), 178
  site 42/66A6–4, 174, 175 (map), 191 (table)
  site 42/66A6–5, 173–174
  skeletal remains from, 257–266
Dogs, 87, 236, 237
  domestic, 56, 69
Donohoe, John C., 8, 31
Drainage system, Addicks Dam Basin, 154
Drills, 41, 42, 73, 77, 82, 86, 221 (table), 225–226, 229, 230, 240, 242, 243, 278, 283
  double-end, 226
  expanding base, 225–226
  stemmed, 226
  stone, 72, 200 (table)
  T-shaped, 37
Dry Creek, S. Dak., 74, 78, 85
Dubose, Dude, 308
Dunn site (25FR2), 129–130 (table)

Eagle Creek, Nebr., 53, 137
Eden Valley Yuma horizon, 50
Edgemont Reservoir site, Wyo., 29–30, 85
Edgemont, Wyo., 10, 31, 49, 56
Edwards, Guy D., 2
Edwards Plateau, Tex., 220
Elberton, Ga., 307
Elkhorn River, 43, 46
Ellsworth, Kans., 34, 37
Elm, 26, 35, 38, 109
Elm Creek, Kans, 35, 36
  site 14EW12, 37
El Orcoquisac village, Tex., 160
El Paso, Mex., 274
Equus complicatus, 235
Ericson Reservoir site, Harlan County, Nebr., 21, 43, 46
Erosion intervals, 300 (table)
Ethnohistory, 157–162
Etowah Valley, Ga., 310, 317
European contacts, 58

Fairbanks, Charles H., 315
Federal water-control program, 59, 65, 71, 88

Field work and explorations, 11–33
  by cooperating agencies, 33–48
  in paleontology, 31–33
Figurines, 242
Fir, 86
Fire basins, rock-lined, 22, 51
  beds, 310
  pits, stone-filled, 22, 40, 51, 238
Fireplaces, 15, 17, 19, 22, 23, 30, 40, 50, 51, 76, 77, 95, 238, 314
  circular, 77
Fish, 157, 237
  fossil, 33, 43, 93
Fishing, 17, 57, 234
Flag Creek site 25HN4, 129–130 (table)
Fleshers, 41
Flint, 162, 276, 277
  chips, 36, 88, 93
"Flint Hill," Hell Canyon, S. Dak., 23
Folsom complex, 50, 56
Fort Bennett, S. Dak., 8, 27
Fort Pierre, S. Dak., 27
Fort Randall Dam, S. Dak., 12, 20, 24, 49, 53, 54, 67, 97
Fort Randall Reservoir, investigations, 24–25
  site 39CH4, 53
  site 39CH9, 53
Fort Sully village (39 SL4), S. Dak., 28
Fort Yates, N. Dak., 27, 28
Fossils, 81, 85
  Cretaceous, 93
  Lower Eocene, 32
  Miocene, 32
  Oligocene, 32, 81
  Pleistocene, 93
  Pliocene, 43, 93, 94
  Upper Cretaceous, 33
Franke, Carol, 107
Frankforter, W. D., 38, 91
Franklin, Nebr., 38
Fraser, Dorothy E., 8, 20
Fraxinus americana, 110
Freemont, John C., quotations from, 110
Fruits, wild, 79, 109

Galenkamp, Charles, 149
Galveston Bay, Tex., 153, 155, 158–161, 184, 195
  early exploration of, 158–160
  historic Indians around, 160–161
Galveston Bay Indians, culture of, 161–164
Galveston Island, Tex., 158
Garay, Francisco de, 158
Gar (fish), 235, 237
Garrison, N. Dak., 10, 67
Garrison Dam, N. Dak., 97
Gatherers, 24
Gathering, 234, 240
Genoa, Nebr., 45
Geology, 154
Geology of the Hodges Site, Quay County, New Mexico (Judson), 285–302
Glebula rotundata, 235
Glendo, Wyo., 10
Glen Elder Reservoir, Kans., 88, 89
  investigations, 89–90
  site 14ML1, 89
  site 14ML8, 89
Glen Elder (town), Kans., 89
Goldstein, Marcus S., 257, 264, 265, 266
Gosper County, Nebr., 43
Gouges, 23
Graham Ossuary, Nebr., 126
Graham site 25HN5, 111, 112, 118, 128, 129–130 (table), 131, 135
Grand River, S. Dak., 26, 74, 83
Grapes, wild, 109
Graphite, 75
Grass, 35, 72, 73, 76, 80, 81, 85, 86, 87, 109, 113
  marsh, 157
  switch (*Panicum virgatum*), 156
  water (*Paspalum* sp.), 157
Gravers, 82, 200, 221, 227, 229, 230, 240, 243
Great Bend culture, 37, 54
Great Plains region, 43, 49, 52, 54, 77
Greens Bayou, Tex., 155
Griffin, James B., 149, 190, 194
Griffith, D. W., 149
Grinding implements, 22, 42
Grinding slabs, sandstone, 37
Grisbee site (42/66A3-1), 174, 182 (map), 183 (fig.), 191 (table), 219, 238, 244
Guadalupe Mountains, N. Mex., 277
Guide Rock, Webster County, Nebr., 39, 137
  site (25WT3), 118, 129–130 (table)
Gunnerson, D., 43
Gunnerson, J. H., 43
Guns, figures of, 78, 79
Gypsum, 33

Hackberry, 35
Hall, Robert L., 8, 19, 20
Hammers, stone, 314
Hammerstone, 83, 86, 136, 228, 229, 243, 279, 283
Handstones, 201, 221, 228, 230, 240, 242
Han Indians, 160
Harlan County Dam, description of, 38
Harlan County Reservoir site, Wyo., 10, 21, 38–43, 49, 54, 55, 67, 68, 69, 91, 92, 95, 100
  investigations, 92–93, 98, 114, 132
  site 25HN11, 92
  site 25HN37, 92, 95
Harpe, Barnard de la, 159, 161
Harvard University, 289
Hasinai Indians, 158, 159
Hatchets, 314
Hat Creek, Nebr., 23

Haury, Emil W., 149
Hay cultivation, 39
Heart Butte, N. Dak., 3, 8, 11, 49
Heart Butte Reservoir site, investigations, 19–20
Heart River, N. Dak., 19, 26, 27, 73
Hearths, 51, 75, 76, 77, 78, 85, 86, 93, 94, 99
  basin-shaped, 36, 75
  rock, 30, 31, 51
Hecker, Thad C., 19
Helena, Mont., 90
Heliosonia trivolvis, 235
Hell Canyon, S. Dak., 23
Hell Creek, Kans., 90
Henrietta, Tex., 274
Hewes, Gordon W., 19, 47, 48, 53, 96, 97
Hickoria cordiformis, 156
High Plains area, Nebr., 55
Hill, A. T., 38, 107, 111, 130
Hodges site, N. Mex., 271
  Area A, 272, 273 (fig.), 274, 275, 276, 277, 278, 279, 280, 281, 291
  Area B, 272 (fig.), 275, 277, 278, 279, 280, 281, 291
  conclusions, 282–283, 297–301
  excavation and stratigraphy, 272 (fig.), 273 (fig.), 274, 291 (fig.)
  faunal material, 280–281
  geology of, 285–302
  physical setting, 289, 290 (map), 291 (fig.)
  sequence at, 294–295, 296 (fig.), 297, 299 (table), 300 (table)
Hoe, bison scapula, 16, 41
  bone, 17
  shell, 37
Holden, W. C., 274
Holder, Mr. and Mrs. Preston, 38, 42
Holdredge burial site 5 (25FR9), 112, 129–130 (table)
Hollywood, Ga., 315
Homestead National Monument, Nebr., 12
Hopewellian sites, 37
Horn industries, 57
Horrell, John, 107
Horse, acquisition of, 53, 56
  fossil, 94
  native, 50, 235, 237
Horsehead Creek, Angostura, S. Dak., 11, 21, 22, 31, 32, 74, 76, 77, 100
Horsepen Creek, Tex., 151, 155, 174, 182
Horse Thief Canyon, Kans., 35
Horticultural peoples, 39, 54, 58, 100, 110
Hot Springs, S. Dak., 20, 21, 32, 74
House floors, 41
  pits, 28, 29
  sites, 40, 55, 76
Houses, grass, 57
  jacal type, 282
Housing, 162
Houston, Tex., 151, 155, 156, 163
Huddleston, T. E., 2
Hudson Farm (14EW24), Kansas, 36
Hughes, Jack T., 8, 11, 20, 29, 32, 67, 68, 70, 71, 74
Hunters, 24, 58
Hunting, 16, 57, 162, 234, 240, 277
  camps, 20, 21, 54, 55
Hunting and gathering peoples, 39, 52, 56, 57, 75, 85, 91, 99, 162, 245, 282, 283
Huron Indians, 118
Hut rings, 27

Implements, bone, 117
  chipped stone, 83, 200 (table)
Indian Hill (14EW1), Kans., 35
Indian Knoll, 220
Indian Skeletal Remains from the Doering and Kobs Sites, Addicks Reservoir, Texas, (Newman), 253–266
Indian-White contacts, 100
Insectivores, fossil, 32, 43
Irene, Ga., 310, 315
Iron, surface, 41
Isla Malhado, Tex., 160
Isto, Neil, 68, 72, 74, 84

Jackson Narrows, S. Dak., 74, 78
Jar, elongated globular, 195, 239
  pottery, 178, 194, 196, 314, 316
Jasper, 121, 122, 123
Jemez Mountain area, 278
Jennings, J. D., 2, 281, 282
Johnson Siding Reservoir site, 20
Johnson Siding, S. Dak., 10, 49
Jones, Charles C., Jr., 307, 309–310, 311, 314, 320
Judson, Sheldon, 271, 280, 289
  (Geology of the Hodges Site, Quay County, New Mexico), 285–302
Judson's Modern Sand, 274
  No. 2/3 Sand, 272, 274
Juniper, 19, 72, 85, 86
Juniperus americana, 309

Kanopolis Reservoir area, Kans., 34, 35, 37, 49, 52, 54
  site 14EW6, 54
Kansas River Basin, 54, 58
Kansas, sites investigated, 34–37, 88–90
Karankawa Indians, 160, 161, 162, 195, 196, 246, 265
Kay, J. Leroy, 32
Keith Focus, Woodland culture designation, 16, 52, 136
Kelley, J. Charles, 149, 197, 202, 219
Kelly, A. R., 315
Keyhole Reservoir site, Wyo., 10, 29, 30–31, 49, 56, 85
Kidder, A. V., 281
Kiowa Indians, 23
Kivett, Marvin F., 8, 11, 12, 13, 16, 34, 39, 40, 47, 52, 67, 70, 91
  (The Woodruff Ossuary, a Prehistoric Burial Site in Phillips County, Kansas), 103–130
Kleinsasser, Glenn, 68

Knife fragments, 72, 82
Knife River, S. Dak., 27
Knives, 73, 76, 77, 83, 88, 94, 200 (table), 221 (table), 229, 243, 275
    beveled, 223, 230, 240
    bifacial, 277
    chalcedony plate, 23
    chipped, 22, 30
    convexoconvex, 277
    flake, 37, 277, 278, 283
    flint, 35, 277
    leaf-shaped, 222, 277
    long narrow, 223
    ovoid, 223
    planoconvex, 277
    prismatic, 89
    refined, 277–278, 283
    stemmed, 220, 221, 222, 230, 239
    triangular, 222
Kobs site (42/66A6–3), 174, 176 (map), 177 (map), 178, 179 (figs.), 180 (figs.), 181, 182, 190, 191 (table), 193, 194, 215 (graph), 218, 219, 229, 233, 236, 237, 238, 240, 244, 245, 265
    skeletal remains from, 257–266
Krieger, Alex D., 149, 197, 219

Lake McConaughy, Nebr., 43
Lamar site, Ga., 315, 317, 319, 320
Lampsilis ventricosa occidens, 136
Lances, feathered, 78
Lander, Wyo., 86
Langham Creek, Tex., 151, 155, 163, 174, 176, 182
Lasmigona complanata, 136
Lawrence, Barbara, 280
Leavenworth (39C09), S. Dak., 28
Lemmon, S. Dak., 83
Leon, Alonso de, Jr., 159
Lepidosteus sp., 235
Leuty, William O., 34
Lime Creek, Nebr., 15, 38, 41, 42, 50, 93, 99
    site 25FT41, 50, 93, 99
    site 25FT50, 50, 93
Lincoln Municipal Airport, cooperation of, 8, 68
Lincoln Office, River Basin Surveys, 34, 66, 67, 70
Lindenmeier Folsom horizon, 50
Lissie Formation, Pleistocene age, 154
Literature cited, 141, 248–252, 266, 283–284, 301–302, 320
Lithic artifacts, 220–230
    stratigraphy and discussion, 228–230
Lithic complex, 196–233
    discussion, 218–220
Little Arkansas River, Kans., 34
Little Knife River, N. Dak., 96
    site 32MN9, 96
Little Missouri River, 55
Little Popo Agie River, Wyo., 86
Little Wind River, Wyo., 86
Llano Estacado (Staked Plains), N. Mex., 271, 292, 294
Lodges, earth, 17, 37, 39, 53, 57
Lodge sites, 22
Loess Plains area, Nebr., 43, 109
Logan Museum of Beloit College, 27
Long site (39FA65), Angostura Reservoir, 49, 51, 77, 99
Loretto, Boone County, Nebr., Reservoir site, investigations, 44, 45, 49
Loseke Creek, Nebr., 53, 137
Lost Cabin faunal zone, 32
Loup River, 43, 44, 45
Lower Cheyenne Village (39ST1), S. Dak., 28
Lower Mississippi Valley culture, 195, 220
Lower Platte Basin, Nebr., 38, 43, 54
    archeological reconnaissance, 43–46
Ludlow Cave, S. Dak., 83
Lundelius, Ernest L., 8, 31
Lusk, Wyo., 51
Lynx rufus texanus, 157

Maize, 56, 57, 110
    culture, 16, 282
Maize-bean-squash horticulture, 53
Maize-growing peoples, 53
Malouf, Carling, 90
Mammalian remains, 319
Mammals, fossils, 32, 93
Mammoth, Columbian, 50
Mandan Indians, 26, 55, 58, 83
Mandibles, badger, 128
    rabbit, 128
Mankato substage of Wisconsin glaciation, 50
Manos, stone, 30, 36, 51, 76, 77, 78, 79, 80, 82, 86, 279
    subrectangular, 23
Maple, ash-leaved, 110
Marcasite, 33
Marshall Ossuary, Nebr., 126
Marshall site (25HN1), 112, 118, 127, 129–130 (table), 135
Matagorda Bay, Tex., 158
Material culture, 184–248
Mayeye Indians, 161
McAllister, J. G., 149
McCann, Franklin T., 289
McCook, Nebr., 93
McKenzie, Gordon F., 8, 20
Mealing slabs, 22
Medicine Creek Dam, description of, 13, 14, 52
Medicine Creek, Nebr., 3, 9, 11, 12, 14, 15, 38, 42, 48, 51, 54, 68, 69, 93, 94, 98, 132
Medicine Creek Reservoir site, investigations, 12–18, 38, 41–43, 91, 93–94, 99
    site 25FT18, 52
    site 25FT40, 94

Medicine Creek Reservoir site—Con.
    site 25FT41, 93, 94
    site 25FT42, 93, 94
    site 25FT49, 94
    site 25FT50, 49, 93, 94
    site 25FT70, 52
Mera, H. P., 281, 282
Metates, 51, 76, 77, 279–280
Metcalf, George, 8, 12, 13, 68, 71
Mexican Creek Valley, S. Dak., 81
Mica, 310, 318
Micrurus fulvius fulvius, 157
Middens, 41, 54
Middle Loup River, Nebr., 94
Miller, Carl F., 307
Milling pits, 291
Milling stones, 201, 221, 228, 230, 240, 242
Minerals, miscellaneous, 228
Mink, 235, 237
Missions, founding of, 160
    San Francisco, Tex., 160
    San Ildefonso, Tex., 160
Missouri Basin Indians, 9
Missouri River, 9, 25, 26, 27, 32, 53, 55, 56, 58, 59, 65, 68, 69, 72, 74, 80, 81, 92, 96, 97, 101
Missouri River Basin Survey, 2, 3, 4, 11, 12, 34, 65, 66, 67, 70, 74, 90. 97
    cooperating agencies, 87–97
    field work and explorations, 70–87
    laboratory activities, 8–11, 68–70
    personnel, 1948, (list) 8, 67–68
    résumé and conclusions, 48–59, 97–101
    sites investigated, 5–7 (table)
Mitchell Creek, Nebr., 94
Mobridge, S. Dak., 27, 28
Mollusca, 69
Montana, sites investigated, 90–91
Montana State College, 31
Montana State University, 90, 91
Moorcroft, Wyo., 30
Moorhead, Montana–Wyoming border, 56, 84
Moorhead Reservoir area, Montana–Wyoming border, 70, 71, 84
    investigations, 84–85
Moreau River, S. Dak., 74, 80
Morhiss site, Texas Gulf Coast, 220
Morrison, J. P. E., 107, 125, 149
Morse, Stanley, 165
Mortar, bedrock, 279, 280, 283
Moscoso, 158
Mule Creek, Wyo., 31
Mullen, Nebr., 43, 94, 95, 98, 100
Mullen Reservoir site, Nebr., 21, 67, 68, 91
    investigations, 94–96
Museum Comparative Zoology, Harvard University, 280
Muskogean-speaking peoples, 309, 319
Mussels, fresh-water, 57, 274, 281
Mutch, C. L., 13

Nacatoches settlement, Tex., 159
Narvaez Expedition, explorations of, 158
National Park Service, 10, 12, 34, 65, 66, 67, 69, 71, 87
    Chief Historian's Office, 66
Nebraska, sites investigated, 12–18, 38–43, 91–96
Nebraska State Archeological Survey, 111
Nebraska State Historical Society, 4, 9, 10, 12, 38, 39, 41, 49, 67, 69, 91, 93, 95, 107, 111, 112, 131, 133
Neches River, Tex., 154, 161
Needles, bone, 42
Newcastle, Wyo., 29, 51
Newman, Marshall T. (Indian Skeletal Remains from the Doering and Kobs Sites, Addicks Reservoir, Texas), 253–266
Niobrara chalk, Cretaceous deposits from, 93
Niobrara River, 55, 58
Nixon, A. E., 8, 68
Nonhorticultural peoples, 53
Nonpottery-making peoples, 45, 51, 79, 80, 82, 85
North Dakota Historical Society, 19, 27, 47, 49
North Dakota, sites investigated, 19–20, 46–48, 71–74, 96–97
North Fork, Bad River, S. Dak., 80, 81
    Grand River, S. Dak., 82, 83
    Little Wind River, Wyo., 86
    Popo Agie River, Wyo., 86
    Solomon River, Kans., 109, 110
North Loup River, Nebr., 91
Norton, Kans., 10
Nuestra Señora de la Candelario Mission, Tex., 160
Nuestra Señora de la Luz Mission, 160, 246
Nuñez, Cabeza de Vaca, Alvar, 158, 161, 162

Oahe Reservoir site, S. Dak., 11, 20, 25–29, 49, 67, 68, 69, 97
    description of, 26, 28
Oak, 26, 156, 174
    yellow (*Quercus velutina*), 156
Obovaria olivaria, 136
Obsidian, 18, 30, 31, 75, 275, 277, 278
Occupational level, 1, 42
Occupational sites, 35, 83, 94
Occupational zone C, 93
Odocoileus virginianus, 319
    sp. 235, 236
    virginianus texanus, 157
Ogallala, Keith County, Nebr., 43
Olivella nivea, 126, 136
    sp., 126, 136
Olson, James C., 107

Onion Flat Reservoir site, Wyo., 68, 70, 71, 84, 85
  investigations, 85–86
Opossums, 110, 235 (table), 237
Oregon Basin, Wyo., 10
Orleans, Nebr., 38, 137
  site 25HN3, 129–130 (table)
Ornaments, mussel-shell, 48, 117
  shell, 118
Orobio Bazterra, Joaquin de, 159, 162
Oso Mound, Nueces County, Tex., 264, 265
Oto Indians, 111
Oyster Creek, Tex., 154

Pactola Reservoir site, S. Dak., 10, 20, 49
Paint pigments, 201, 221, 228
Paleo-Indians, 293
Paleontological surveys, 73, 74, 80, 81, 82, 83, 84, 85, 86, 87
Panicum virgatum, 156
Paradise Creek, Kans., 90
Paspalum sp., 157
Paste, manufacture of, 184–185, 196
Pastures, 39
Patiri Indians, 161
Pawnee Indians, 16, 17, 39, 40, 58, 110
Pearls, fresh-water, 112
Pecos Pueblo, 278
Pecos River, N. Mex., 275, 276, 277, 279, 281
Penasco Blanco River, 281, 282
Pendants, biperforate shell, 37
  oval, 15
  shell, 52, 112, 117, 124, 125, 128, 233, 281
Perissodactyls, fossil, 32, 43
Personnel, list of, 8
Pestles, 279, 280
Petroglyphs, 35, 37, 78, 87, 90
  recent, 78
Pheasants, 110
Philip Reservoir site, S. Dak., 70, 71, 74, 80
  investigations, 80–81
Philip, S. Dak., 81
Pickstown, S. Dak., 24
Pickwick Basin, 220, 230
Pierre, S. Dak., 9, 20, 25, 26, 27, 28, 97
Pierre shale, 81
Pike, Zebulon M., 111
Pine, 87, 156, 174
  lodgepole, 86
  short-leaf (*Pinus echinata*), 156
  yellow, 30, 85
Piñeda, Alonzo de, 158
Pine Ridge Indian Reservation, S. Dak., 81
Pinus echinata, 156
Pioneer, Colo., 10
Pipe, clay, 314, 317
Pipestone, 73
Plains Apache Indians, 22, 55, 58, 92, 95, 100, 101, 111
Plainview, Tex., 93, 99
Plants, domestic, 56
Platte River watershed, Nebr., 43, 45
Plaza Larga Creek, N. Mex., 271, 272, 289, 290, 294, 296, 297, 298
Pleistocene sequence, 292–294, 298
Plum Creek Reservoir site, Gosper County, Nebr., investigations, 45–46, 49
Plums, wild, 109
Points, Folsom, 96
  obliquely flaked, 93
  Plainview, 93, 99
Pomme de Terre Reservoir site, 68
Popo Agie River, Wyo., 86.
Post molds, 15, 17, 40, 95
Post-White era, 35
Potatoes, wild, 162, 234
Potsherds, 21, 36, 37, 41, 44, 45, 46, 53, 76, 77, 78, 83, 89, 111, 118, 128, 174, 176, 183, 184, 308, 313, 314, 315, 316, 317
Pottery 17, 21, 57, 72, 75, 91, 96, 118–119, 128, 129–130 (table), 162, 171, 178, 196, 246, 281–282, 310, 314, 315–317, 318–319 (list)
  black-and-white ware, 282
  brown ware, 276, 281, 282, 283
  calcite-tempered, 15, 37, 52, 118, 119, 132, 184, 239, 242
  Chupadera, 274, 275, 282, 283
  coiled, 194
  colors, 184, 185, 239, 316
  cord-roughened, 15, 19, 21, 52, 53, 54, 76, 77, 95, 100, 119, 128, 317
  decorated, 44, 45, 53, 189, 195, 239, 316
  dentate-stamped, 37
  discussion, 192–196
  distribution, 189
  El Paso polychrome, 282
  Etowah Stamped, 317
  fabric marked, 25
  Geneseo Plain, 36
  Geneseo Simple Stamped, 36
  Goose Creek Incised, 189, 191, 195, 239
  Goose Creek Plain, 184–189, 239
  gray to buff, 80, 119, 316
  grit-tempered, 25, 37, 44, 46, 80, 95
  Harlan cord-roughened, 131, 132, 133, 134, 135
  Hopewell, 37
  incised, 21, 189, 316
  Irene Incised, 316
  Lamar Bold Incised, 315, 316
  Lamar Complicated Stamped, 308, 309, 315, 316, 317
  Lamar Plain, 315, 316, 320
  "Mandan-Hidatsa type," 83
  Mandeville Plain, 194
  manufacture of, 184–185
  mica-tempered, 41
  Mississippi complex, 194

Pottery—Continued
  Northern Woodland, 195
  paddle stamped, 195, 316
  Plain Red, 274
  prehistoric, 96
  protohistoric, 96
  puebloan, 18, 41, 276
  quartz-tempered, 316
  red ware, 281
  rocker-marked, 37
  Rockport Focus, 190, 195
  St. John's, 194
  sand-tempered, 41, 80, 184, 194, 239, 281
  Savannah Check Stamped, 317
  shale-tempered, 37
  shapes, 185, 186 (fig.), 187 (fig.), 188 (fig.), 189, 192 (table), 194, 239
  shell-tempered, 46
  Socorro, 275
  Spanish wheel-made, 315
  stamped, 19, 21, 41, 46, 316, 317
  surface finish, 185, 189
  Tchefuncte Stamped, 178, 190, 193, 194, 195, 239, 244
  tempering, 184, 239, 242
  texture, 184
  tooled, 77
  undecorated, 80
  unidentified, 190
  Upper Republican type, 36, 37, 44, 45, 113, 131
  Valley cord-roughened, 131, 132, 133, 134, 137
  Weeden Island, 194
  Woodland type, 36, 37, 44, 45, 131, 133, 195
  Woodstock Diamond Stamped, 317
  zone-decorated, 37
Pottery-bearing sites, 93
Pottery complex, 184–196
Pottery-making peoples, 24, 45, 52, 57, 79, 85, 192, 282, 283
Poverty Point, 220
Powder River, Mont. and Wyo., 84, 85
Prairie Dog Creek, Nebr., 38, 40, 92, 109, 110, 111, 113, 124
  site 25HN39, Nebr., 89
Prairie Dogs, 110, 280
Preceramic peoples, 57, 76, 82, 85
Pre-Mankato climax dating, 99
Prepottery cultures, 93
Pre-White culture, 76, 98
Primates, fossil, 32
Procyon lotor, 157
  sp., 235
Projectile points, 22, 23, 50, 51, 72, 76, 85, 86, 91, 93, 96, 99, 121, 174, 197, 201–220, 234, 239, 274–276, 283
  Alba Barbed, 178, 198, 202, 214, 216, 218, 220, 242, 244
Projectile points—Continued
  antler, 232, 240, 241
  Baird beveled, 199, 214, 242
  chipped, 25, 30, 31, 198–200 (table)
  Clovis Fluted, 199, 205, 211, 216, 217, 219, 220, 240, 241
  concave-based, 77, 122
  "contracting stem," 198
  Copena Point, 199, 213
  corner-notched, 15, 22, 31, 37, 52, 82, 276
  distribution, 216–217 (table)
  Eddy Stemmed, 176, 178, 198, 202, 216, 217, 242
  expanded-base, 37, 239
  "fish-tailed," 31
  Gary Stemmed, 171, 178, 183, 199, 204–205, 214, 215 (graph), 216, 217, 218, 219, 220, 239, 242
  Jumano Phase, 274
  Kobs triangular, 197, 198, 202, 203, 216, 217, 242
  lanceolate, 23, 31, 76, 77
  leaf-shaped, 42
  long, 198
  metal, 83
  Middle and Lower Level types, 199, 204–211
  Nebo Hill, 219, 220, 240, 241
  Pedernales Indented base, 210, 241
  Perdiz Pointed Stem, 171, 176, 178, 183, 198, 201, 202, 214, 216, 217, 218, 219, 220, 242, 244
  Plainview Point, 199, 213, 219, 241
  provisional types, 198–199 (table), 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 216, 217, 220, 240, 241, 242, 243
  Scalhorn Stemmed, 178, 198, 201–202, 216, 242
  Scottsbluff, 220, 240, 241
  serrate, 52
  side-notched, 73, 77, 83, 276
  stemmed, 17, 37, 48, 52, 88, 165
  stone, 318
  stratigraphy of, 214–218
  triangular, 36, 41, 77, 274, 275, 278
  Typological Concept of, 197
  unplaced types, 199, 211–214
  Upper Level types, 201–203 (table)
  Wells Contracting stem, 199, 205
Pueblo of Pecos, N. Mex., 275, 278
Pueblo region, N. Mex., 54, 275, 278
Punches, bone, 48

Quadrula quadrula, 136
  speciosa, 235
Quartz, 37, 123, 316, 318
Quartzite, 23, 121, 274, 275, 276, 277, 278, 279
Quercus velutina, 156
Quimby, George I., 190, 193

Rabbit, 42, 110, 235–236 (table), 237
    cottontail, 87, 280
    jack, 280
Rabbit teeth, 121
Raccoons, 110, 235 (table), 237
    (*Procyon lotor*), 157, 319
Radiocarbon dating, 193–194
Raft Lake Reservoir site, Wyo., 70, 71, 84
    investigations, 86
Rapid Creek, S. Dak., 20
Rattlesnake, eastern (*Crotalus horridus*), 157
Reagan, Ina May, 8, 68
Rebecca Creek, Nebr., 112
Recreation Survey Office, Region 2, 66
Red River Drainage, S. Dak., 26
    Tex., 274
Red Rock Canyon, Kans., 35
Redondo formation, 290
Red Willow, Nebr., 10
Refuse deposits, 27, 28
Rehder, Harald A., 107
Rembert, Captain, 314
Rembert Mounds, The, Elbert County, Georgia (Caldwell), 303–320, 308 (map)
    conclusions, 319–320
    the large mound, 309–311 (map), 312 (figs.), 313 (figs.)
    the small mound, 314
    the village site, 314–315
    trait list, 318–319
Renaud, E. B., 281
Reptiles, 42
    fossil, 32, 93
Republic, Kans., 39
Republican City, Nebr., 38
Republican River Basin, 10, 14, 38, 95, 126
Republican River, Nebr., 38, 39, 40, 46, 91, 92, 93, 109, 110, 111, 112, 113, 118
Republican River Terrace, 2, 42, 50, 94
Rhinoceros, fossil, 94
Rio, Domingo del, 160
Rio Grande River, 161, 274, 276, 278, 282, 283
Rio Puerco, N. Mex., 275, 282
River Basin Surveys, 2, 4, 12, 13, 20, 24, 31, 32, 33, 34, 39, 40, 41, 42, 43, 47, 48, 49, 54, 70, 71, 80, 82, 83, 84, 86, 87, 88, 89, 90, 91, 93, 94, 96, 98, 99, 107, 114, 151, 246
    former reports, 321–322
    procedure of, 3, 73
Rivera, General, 159
Roasting pits, 22, 30, 40, 51, 76
Robb site (25WT4), 129–130 (table)
Roberts, F. H. H., Jr., 1, 51, 65, 149, 278, 279, 280, 282, 289
Robinson, H. E., 13
Rock Creek, Nebr., 10
Rock shelters, 20
Rockville, Nebr., 43
Rockyford Reservoir site, S. Dak., 70, 71, 74, 81–82
    investigations, 81–82
    site 39SH1, 82
    site 39SH2, 82
    site 39SH3, 82
Rodents, fossil, 32, 43, 94
Rods, clay, 190
Rogan, John P., 307, 310, 311
Rosedale (formerly Clearwater), Antelope County, Nebr., 44, 49
Rosedale Reservoir site, investigation, 46
Russell, Kans., 90
Rygh (39CA4), S. Dak., 28

Sabine River, Tex., 154
Sagebrush, 30, 86, 87
Salina, Kans., 34
Saline River, Kans., 88, 90
San Agustin de Ahumada presidio, Tex., 160
San Bernard Creek, Tex., 154
San Francisco Mission, Tex., 160
San Gabriel River, Tex., 160
San Ildefonso Mission, Tex., 160
San Jacinto River, Tex., 151, 154, 155, 161
San Jon area, 274, 276, 277, 278, 279, 280, 282, 283, 289, 290 (map), 299 (table), 300 (table)
Sandhill area, Nebr., 43, 55, 94, 95, 96
Sandstone, 34, 35, 37, 229, 279
Savannah River, Ga., 307, 309, 320
Saws, sandstone, 201, 227, 229, 242
Sayles, E. B., 150
Schultz, C. B., 38, 91
Sciurus carolinensis, 157
    niger rufiventer, 157
Scotty Phillips Ranch site (39T14), S. Dak., 28
Scraper-graver tools, 41
Scrapers, 48, 76, 77, 83, 85, 86, 94, 136, 174, 221 (table), 240, 277
    chipped stone, 30, 36, 200 (table)
    concave, 276
    end, 15, 23, 35, 36, 37, 41, 82, 88, 89, 127, 136, 200, 224, 230, 242
    flake, 200 224
    gougelike, 42
    nondiagnostic, 94
    planoconvex, 22, 37, 276
    side, 23, 37, 88, 200, 224, 242, 243, 276, 283
    snub-nosed, 276, 283
    trapezoidal, 42
Semihorticultural Indians, 52, 53, 54, 57, 79
Seventh Plains Conference for Archeology, 70
Shadehill Reservoir, S. Dak., 70, 71, 74, 82
    investigations, 82–84

Shaft wrenches, bison-rib, 41
Shale, 276
Sheep, 87
Shellfish, 162, 234, 236, 237, 240, 246
Shell fragments, 77, 90, 94, 114, 115
Shell industries, 57, 123–126, 129 (table), 234, 242
Shells, 280–281
    clam, 165
    conch, 125, 136, 319, 320
    fresh-water, 112, 116, 118, 126, 128, 281
    marine, 112, 117, 118, 126
    mussel, 76, 93
    table of, 136
Sheps Canyon, S. Dak., 21
Sheyenne River, N. Dak., 47
Shippee, J. M., 8, 12, 20, 25, 29, 34, 39, 40, 68, 71, 107
Shoshonean Indians, 24, 56, 84
Shoshoni, Fremont County, Wyo., 31
Signal Butte 1, 50
Sims, John M., 149
Sioux, 79
Sixth Plains Archeological Conference, 11
Skeletal remains from Doering and Kobs Sites, Addicks Reservoir, Tex., 257–266
Skeletons, 47, 48, 69, 116, 127, 314
    analysis of, 264–266
    extended, 17
    female, 266
    pathology, 266
    Woodruff, 137–140
Skull fragments, 258 (fig.), 259 (table), 260, 261, 263
Skulls, 116, 258 (fig.), 260 (fig.), 262 (figs.), 263 (fig.), 314
    artificial deformation, 266
    long-headed, 264, 265
    measurements of, 139–140 (table), 258
    pathology, 266
    round-headed, 264, 265
Skunks, 110
Smith, Carlyle S., 34, 35, 88
Smoky Hill Basin, Kans., 10, 33, 34, 35, 55
Smoky Hill River, Kans., 34, 36, 38, 53, 54, 88
Smoothing tools, bison-rib, 48
Snails, 235
Snake, coral (*Micrurus fulvius fulvius*), 157
Society for Vertebrate Paleontology, 31
Solomon River, Kans., 88, 89
Solomon Valley, Kans., 89
Soral Creek Reservoir site, Wyo., 70, 71, 84, 86
    investigations, 86–87
Soto, Hernando de, 158
South Dakota Archeological Commission, 27
South Dakota, sites investigated, 20–29, 74–84
South Fork, Grand River, S. Dak., 82, 83
South Mayde Creek, Tex., 151, 155, 163, 164, 167, 168 (map), 174
Southwestern Archeological Conference, 197
Spalls, stone, 31
Spanish Diggings, Wyo., 23
Spatula, ulna, 231, 233, 240, 241
Spheroids, stone, 42
Spring Creek, Nebr., 44
Spring Creek, Tex., 161
Spruce, 86
Squash, 16, 57, 110
Squash seeds, 15
Squirrel, gray (*Sciurus carolinensis*), 157
    western fox (*Sciurus niger rufiventer*), 157
Stalling's Island, 220, 230
Steatite, 18
Stereograph, Schwarz, 258
Sterns Creek, Nebr., 56, 137
Stinking Water Creek, Nebr., 55
Stone, chipped, 91
    fire-cracked, 88
    ground, 229
    industries, 57, 121–123, 129 (table)
    worked, 274–280
Storage pits, underground, 16, 27, 57
Strong, William Duncan, 111, 112, 127
    quotations from, 28, 118, 123–124
Subsistence, 234–236
Sundance Creek Reservoir site, Wyo., 22
Sunflower, cultivated, 16, 57
    seeds, 15
Swanton, John R., quotations from, 161, 162, 246

Tatum, Webb, 307
Taxidea sp., 235, 236
Tchefuncte cultures, 178, 218, 220, 244, 245
Teeth, carnivore, 48
    complete dental arch of, 48
    perforated canine, 25, 48
Telegraph Flat, S. Dak., 28
Tents, bearskin, 162
Terraces, tetragon, 314, 319
Terrapene sp., 235, 236
Terry, Mont., 85
Teton Dakota Indians, 23
Texas Council of Archeology, 152, 197
Thomas, Cyrus, 308, 309, 310, 311, 312, 313, 314
Thompson Creek, Kans., 35, 36, 54
Three Cave Farm (14EW7), Kans., 35
Thunderbird, 78
Tiber, Mont., 10, 67
Tipi rings, 22, 23, 72, 83, 85, 91
Toohey, Loren M., 94

Tools, stone, 31
Topography, 152–153 (map), 154
Tortoise, 234, 235, 236, 237
Towns, fortified, 58
Townsend, Broadwater County, Mont., 32
Trading, 57, 58, 246
Trait list, 318–319
Trantina, John, 24
Trees, hardwood, 81
Triassic Age, 290
  sandstone, 291, 292 (fig.), 296 (fig.)
Tri-County Project, P. W. A., 45
Trinity River, Tex., 154, 160, 161
Tubes, bird-bone, 48, 317
Tucumcari Creek, N. Mex., 271
Tucumcari, N. Mex., 271, 282, 290
Tularosa Basin, 283
Tumlin Mound, Ga., 310, 317
Turkey Creek, Nebr., 46
Turkey Creek, Tex., 151, 155, 163
Turtelot, Harry A., 31
Turtles, 41, 157, 165
Two Rock Shelters near Tucumcari, N. Mex. (Dick), 267–284

Unio sp., 281
Uniomerus tetralasmus, 235, 281
U. S. Army Engineers, 290
United States Geological Survey, 31
University of Arizona, 149, 150
University of Kansas Museum of Natural History, 34, 35, 37, 49, 88, 89, 90
University of Michigan, 149, 281
University of Nebraska Laboratory of Anthropology, 38, 39, 40, 43, 44, 45, 46, 49, 50, 54, 66, 68, 70, 91, 92, 100
University of Nebraska, State Museum, 2, 4, 8, 12, 23, 38, 41, 42, 43, 49, 66, 91, 93, 94, 98
University of North Dakota, 19, 27, 46, 47, 49
University of South Dakota Museum, 27
University of Texas, 31
  Department of Anthropology, 149, 152, 197
University of Wyoming, 31
Upper Republican culture, 15, 16, 17, 21, 36, 37, 42, 46, 50, 52, 54, 55, 57, 76, 90, 93, 96, 111, 113, 119, 120, 121, 122, 130, 131, 135, 136, 137
Upper Republican village sites, 14, 15, 16, 17, 18, 39, 44, 54, 92, 100, 126
Ursus americanus, 157

Valley City, N. Dak., 47
Vertebrates, fossil, 43
Vessels, elongate pottery, 25
Villages, ditched and palisaded, 17, 27
  earth-lodge, 27
  fortified, 27
Village sites, 58
Viviparus intertextus, 235

Wakeeney, Trego County, Kans., 33, 88
Wall plaster, clay, 317
Ward, William V., 149
Waterfowl, 110
Wattling clay, 44
Wedel, Waldo R., 70, 107, 112, 127
  (Prehistory and the Missouri Valley Development Program; Summary report on the Missouri River Basin Archeological Survey in 1948), xv–59
  (Prehistory and the Missouri Valley Development Program; Summary report on the Missouri River Basin Archeological Survey in 1949), 61–101
Wheat, Joe Ben (An Archeological Survey of the Addicks Dam Basin, Southeast Texas), 143–252
Wheeler, Richard P., 67, 68, 71, 72, 74, 84
Wheeler Bottom, S. Dak., 25
White, George, 307, 314
White, T. E., 8, 12, 13, 31, 33, 68, 149
White contacts, proof of, 92, 100
Whiteford, G. L., 34
White Oak Bayou, Tex., 155
White Oak Creek, Tex., 152
White Oak Dam site, Tex., 152
White River, Nebr., 23
White River, S. Dak., 74, 81, 82
Wichita Indians, 36, 54, 58, 274
Willey, Gordon R., 315
Willow, 38, 84, 86, 87, 109
Willow, long-leaved, 110
Wilson Reservoir site, Kans., 10, 88, 90
  investigations, 90
  site 14RU2, 90
Wind River Indian Reservation, Wyo., 84
Wind River (town), Wyo., 86
Witte, A. H., 274
Wittry, Warren, 8, 19, 20
Wolbach, Greeley County, Nebr., 44
Wood Island, S. Dak., 25
Woodland culture, 16, 37, 39, 42, 44, 52, 53, 76, 100, 134, 136
Woodland groups, 15, 18, 53, 93
Woodland village sites, 17, 56, 57, 95, 136
  site 25H07, 95
  site 25H09, 95
  site 25H021, 95
  site 25H024, 95
Woodland-Upper Republican-Lower Loup-Pawnee sequence, 55

Woodruff, Kans., 113
Woodruff Ossuary, a Prehistoric Burial Site in Phillips County, Kansas (Kivett), 103–140
  cultural relationships, 130–137
  environmental background, 109–111
  previous archeological work, 111–113
  site 14PH4, 69, 113–118, 124, 126, 128, 129–130
  site 14PH5, 113
  skeletal remains, 137–140
Works Project Administration, 10, 27
Wounded Knee Creek, S. Dak., 81
Wrenches, shaft, 136
Wyoming and Montana, sites investigated, 84–87
Wyoming, sites investigated, 29–31

Yellowstone River, 55, 56
Yellowstone Valley, 85
Yellowtail Reservoir area, 67
Younkin mound, Kans., 133, 134, 135, 137
Yuma complex, 56

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